

EPA REGISTRATION

67690-16

VOLUME 4



SePRO Corporation • 11550 North Meridian Street • Suite 600 • Carmel, Indiana 46032-4565
Phone: (317) 580-8282 Fax: (317) 428-4577

November 22, 2010

Kelly Ballard
Risk Management and Implementation Branch 2
Office of Pesticide Programs (7508P)
Document Processing Desk (DCI/PRD)
U.S. Environmental Protection Agency
2775 South Crystal Drive
Arlington, VA 22202

Subject: 90-Day Data Call-In Response for Flurprimidol (125701)

Dear Ms. Ballard:

SePRO Corporation (11550 North Meridian Street, Suite 600, Carmel, IN 46032, EPA Company Number 67690) is submitting a response to the product-specific Data Call-In notice (DCI) for the active ingredient flurprimidol, dated September 1, 2010. Please find enclosed the following information in support of the 90-Day Data Call-In response:

- Cover letter;
- Application for Registration (EPA Form 8570-1);
- Data Call-In Response Form; and
- Requirements Status and Registrant's Response

If you have any questions or need additional information, please do not hesitate to contact me at (317) 216-8280.

Sincerely,

A handwritten signature in black ink, appearing to read "Tyler Koschnick".

Tyler Koschnick
Director, Research and Regulatory Affairs

Enclosures

NOV 23 2010



Please read instructions on reverse before completing form.

Form Approved. OMB No. 2070-0060

		United States Environmental Protection Agency Washington, DC 20460	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> x </div>	Registration Amendment Other	OPP Identifier Number
Application for Pesticide - Section I					
1. Company/Product Number 67690		2. EPA Product Manager Erik Kraft		3. Proposed Classification <input checked="" type="checkbox"/> None <input type="checkbox"/> Restricted	
4. Company/Product (Name) SePRO Corporation / Flupyrimidol		PM# 20			
5. Name and Address of Applicant (Include ZIP Code) SePRO Corporation 11550 N. Meridian St., Suite 600 Carmel, IN 46032-4565 <input type="checkbox"/> Check if this is a new address		6. Expedited Review. In accordance with FIFRA Section 3(c)(3) (b)(i), my product is similar or identical in composition and labeling to: EPA Reg. No. _____ Product Name _____			
Section - II					
<input type="checkbox"/> Amendment - Explain below.		<input type="checkbox"/> Final printed labels in response to Agency letter dated _____			
<input type="checkbox"/> Resubmission in response to Agency letter dated _____		<input type="checkbox"/> "Me Too" Application.			
<input type="checkbox"/> Notification - Explain below.		<input checked="" type="checkbox"/> Other - Explain below.			
Explanation: Use additional page(s) if necessary. (For section I and Section II.) Submission of 90-day Data Call-In Response.					
Section - III					
1. Material This Product Will Be Packaged in:					
Child-Resistant Packaging <input type="checkbox"/> Yes <input type="checkbox"/> No	Unit Packaging <input type="checkbox"/> Yes <input type="checkbox"/> No	Water Soluble Packaging <input type="checkbox"/> Yes <input type="checkbox"/> No	2. Type of Container <input type="checkbox"/> Metal <input type="checkbox"/> Plastic <input type="checkbox"/> Glass <input type="checkbox"/> Paper <input type="checkbox"/> Other (Specify) _____		
* Certification must be submitted		If "Yes" Unit Packaging wgt. No. per container	If "Yes" Package wgt No. per container		
3. Location of Net Contents Information <input type="checkbox"/> Label <input type="checkbox"/> Container		4. Size(s) Retail Container		5. Location of Label Directions	
6. Manner in Which Label is Affixed to Product <input type="checkbox"/> Lithograph <input type="checkbox"/> Paper glued <input type="checkbox"/> Stenciled <input type="checkbox"/> Other _____					
Section - IV					
1. Contact Point (Complete items directly below for identification of individual to be contacted, if necessary, to process this application.)					
Name James Messina		Title Authorized Representative of SePRO Corp.		Telephone No. (Include Area Code) (202) 772-4932	
Certification I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law.					8. Date Application Received (Stamped)
2. Signature 		3. Title Director of Research & Regulatory Affairs			
4. Typed Name Tyler Koschnick, Ph.D.		5. Date November 22, 2010			

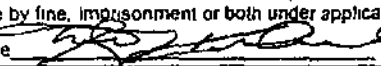
United States Environmental Protection
Agency Washington, D.C. 20460

OMB Approval 2070-0174

OMB Approval 2070-0107
OMB Approval 2070-0057

DATA CALL-IN RESPONSE

INSTRUCTIONS: Please type or print in ink. Please read carefully the attached instructions and supply the information requested on this form.
Use additional sheet(s) if necessary.

1. Company Name and Address SEPRO CORP 11550 N MERIDIAN ST SUITE 600 CARMEL, IN 46032		2. Case # and Name Chemical # and Name 125701 Flurprimidol		3. Date and Type of DCI and Number 01-Sep-2010 GENERIC ID # RR-125701-30036	
4. EPA Product Registration	5. I wish to cancel this product regis- tration volun- tarily	6. Generic Data		7. Product Specific Data	
		6a. I am claiming a Generic Data Exemption because I obtain the active ingredient from the source EPA regis- tration number listed below.	6b. I agree to satisfy Generic Data requirements as indicated on the attached form entitled "Requirements Status and Registrant's Response."	7a. My product is an MUP and I agree to satisfy the MUP requirements on the attached form entitled "Requirements Status and Registrant's Response."	7b. My product is an EUP and I agree to satisfy the EUP requirements on the attached form entitled "Requirements Status and Registrant's Response."
67690-16			Yes	N.A.	N.A.
8. Certification I certify that the statements made on this form and all attachments are true, accurate, and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine, imprisonment or both under applicable law.				9. Date 11/22/10	
Signature and Title of Company's Authorized Representative 				Director, Research and Regulatory Affairs	
10. Name of Company SePRO Corporation				11. Phone Number (317) 216-8580	

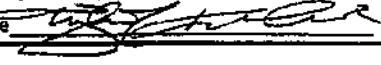
United States Environmental Protection
Agency Washington, D.C. 20460

OMB Approval 2070-0174

OMB Approval 2070-0107
OMB Approval 2070-0057

REQUIREMENTS STATUS AND REGISTRANT'S RESPONSE

INSTRUCTIONS: Please type or print in ink. Please read carefully the attached instructions and supply the information requested on this form.
Use additional sheet(s) if necessary

1. Company Name and Address SEPRO CORP 11550 N. MERIDIAN ST SUITE 600 CARMEL, IN 46032		2. Case # and Name Chemical # and Name 125701 Flurprimidol			3. Date and Type of DCI and Number 01-Sep-2010 GENERIC ID # RR-125701-30036				
4. Guideline Requirement Number	5. Study Title	P R O T O C O L	Progress Reports			6. Use Pattern	7. Test Substance	8. Time Frame (Months)	9. Registrant Response
			1	2	3				
835.6100	<u>Environmental Fate Data Requirements (Conventional Chemical)</u> Terrestrial field dissipation (1)					U, I, K, C	TEP	24	1.
835.6200	Aquatic field dissipation (2)					U, I, K, C	TEP	24	1.
850.5400	<u>Nontarget Plant Protection Data Requirements (Conventional Chemical)</u> Algal toxicity, Tiers 1 and II (3)					U, I, K, C	TEP or TGAI	12	1.
830.7050	<u>Product Chemistry Data Requirements (Conventional Chemical)</u> UV/Visible absorption					U, I, K, C	TGAI/PAI	8	1.
870.3465	<u>Toxicology Data Requirements (Conventional Chemical)</u> 90-day inhalation toxicity (4.5)					U, I, K, C	TGAI	24	1.
870.6200	Neurotoxicity screening battery (6)					U, I, K, C	TGAI	8	1.
870.7800	Immunotoxicity					U, I, K, C	TGAI	12	1.
10. Certification: I certify that the statements made on this form and all attachments are true, accurate, and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine, imprisonment or both under applicable law. Signature and Title of Company's Authorized Representative 						11. Date 11/22/10			
12. Name of Company SePRO Corporation						13. Phone Number (317) 216-8280			

MATERIAL TO BE ADDED TO JACKET

REG #

67690-16

Description:

Label Amendment

check all that apply	
<input checked="checked" type="checkbox"/>	new stamped accepted label
<input type="checkbox"/>	new CSF
<input type="checkbox"/>	notification

Send to CSC

Instructions:

Attach this sheet to the top of **ALL** material sent to the file room (both loose paper and new material in jackets). This sheet will be imaged; a clear description will aid in finding material in the e-jacket. Remove staples from all material. If returning loose paper then hold together with a binder or paper clip. CSFs should be placed in the CSF folder (if returning jacket) or covered with a red CBI sheet (if returning loose paper). Material to be returned to file room should be placed in the appropriate bin.

Reviewer's
Name:

Rae Kearns

Date:

1-19-11

Phone:

805-5611

Division:

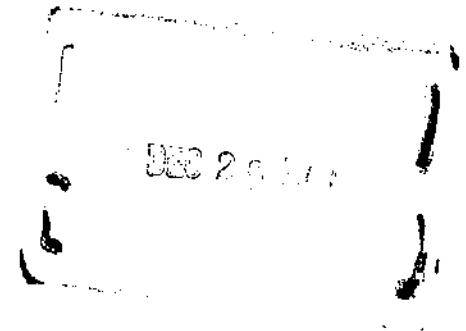
RD



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
CHEMICAL SAFETY AND
POLLUTION PREVENTION

James B. Messina, Agent for
SePRO Corporation
c/o Exponent
Suite 1100
1150 Connecticut Avenue, NW
Washington, DC 20036



SUBJECT: Label Amendment
Cutless Technical
EPA Reg. No. 67690-16; Decision # 398756
Your Submission Dated December 16, 2009

Dear Mr. Messina:

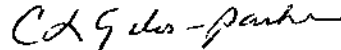
The amended labeling referred to above, submitted in connection with registration under the Federal Insecticide, Fungicide and Rodenticide Act as amended is acceptable provided you submit the following data to the Agency by the due date:

- Guideline 870.3465 - 90-day inhalation toxicity (28 day duration) - due September 1, 2012
- Guideline 870.6200 - Neurotoxicity screening battery - due May 1, 2011
- Guideline 870.7800 - Immunotoxicity - due September 1, 2011

You must submit a copy of the final printed label. A stamped copy of the label is enclosed for your records. This label supersedes all previously accepted labels. If these conditions are not complied with, the registration will be subject to cancellation in accordance

with FIFRA. Your release for shipment of the product constitutes acceptance of these conditions. If you have any questions regarding this correspondence, contact Rose Kearns of my staff by phone at 703-305-5611 or via email at kearns.rosemary@epa.gov or Shaja Joyner at 703-308-3194 or via email at joyner.shaja@epa.gov.

Sincerely,



Cynthia Giles-Parker
Branch Chief
Fungicide Branch
Registration Division (7504P)

Enclosure

Cutless* Technical

EPA Reg. No. 67690-16

Registration Notes: Label amendment submitting in conjunction with the May 6, 2008 Occupational and Residential Exposure and Risk Assessment on Flurprimidol.

Label Notes:

General Label changes:

1. In the ingredients statement, changed the word "inert" to "other".
2. In the First Aid table, in the "If swallowed" section, added the word "immediately" to the first bullet so it reads "Call a poison control center or doctor immediately for treatment advice."
3. Added the sentence "In case of emergency endangering health or the environment involving this product, call **INFOTRAC** at **1-800-535-5053**" to the bottom of the First Aid table.
4. Updated the non-crop uses for this manufacturing use product
5. Updated the Warranty statements.



Cutless* Technical

FOR MANUFACTURING USE ONLY

Active Ingredient

flurprimidol: α -(1-methylethyl)- α -[4-(trifluoromethoxy)phenyl]-5-pyrimidinemethanol 99.3%

Other Ingredients 0.7%

TOTAL 100.0%

EPA Reg. No. 67690-16
FPL021810

EPA Est. No. _____
SPC - _____

SePRO Corporation 11550 N. Meridian St., Ste. 600, Carmel, IN 46032 U.S.A.

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

Keep Out of Reach of Children

CAUTION / PRECAUCIÓN

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand this label, find someone to explain it to you in detail).

Causes Eye Irritation. Harmful If Swallowed. Avoid contact with eyes, skin, or clothing. Wear long-sleeved shirt and long pants and shoes plus socks when handling this product. Wash thoroughly with soap and water after handling.

FIRST AID	
If in eyes	<ul style="list-style-type: none"> Hold eye open and rinse slowly and gently with water for 15 - 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call poison control center or doctor for treatment advice.
If swallowed	<ul style="list-style-type: none"> Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything by mouth to an unconscious person.
Have the product container or label with you when calling a poison control center or doctor, or going for treatment. In case of emergency endangering health or the environment involving this product, call INFOTRAC at 1-800-535-5053.	

ENVIRONMENTAL HAZARDS

Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or other waters unless in accordance with the requirements of a National Pollutant Discharge

Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge. Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority. For guidance contact your State Water Board or Regional Office of the EPA.

Manufacturing Chemical: Do not ship or store with food, feeds, drugs or clothing.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

For Manufacturing Use Only

This product may be used for formulation of EPA-accepted, end-use products for the following non-crop uses:

- Turfgrasses on golf courses and in residential and non-occupational settings (i.e. residential turf, athletic fields, schools, parks, recreational facilities, commercial buildings, municipal sites or other similar settings), applied by a professional applicator or homeowner.
- Established trees and ornamental plants in an outdoor landscape setting, applied by a professional applicator or homeowner.
- Established ornamental trees in utility rights-of-way, urban environments, residential areas and interior landscapes (such as those in domestic landscape/garden areas, public display plantings, recreation areas, highway and other transportation rights-of-way, scenic corridors, storage areas, forest areas, campgrounds, and other uncultivated, nonagricultural areas).
- Container or field grown annual or perennial ornamental plants (e.g. bedding, plug, bulb/fibrous root crops, flowering/foilage, herbaceous/woody) in nurseries, greenhouses, shadehouses or similar structures by a professional applicator.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

Pesticide Storage: Store in a cool dry place. Store in original container only. In case of spill, contain material and dispose of as waste.

Pesticide Disposal: Wastes resulting from the use of this product must be disposed of on site or at an approved waste disposal facility.

Nonrefillable Container Disposal (non-rigid, any size): Do not reuse or refill this container. Completely empty container by shaking or tapping sides and bottom to loosen clinging particles. Empty residue into manufacturing equipment. Dispose of liner and container in a sanitary landfill or by incineration, or, if allowed by state and local authorities, by burning. Offer for recycling if available.

TERMS AND CONDITIONS OF USE

If terms of the following *Warranty Disclaimer, Inherent Risks of Use and Limitation of Remedies* are not acceptable, return unopened package at once to the seller for a full refund of purchase price paid. Otherwise, to the extent consistent with applicable law, use by the buyer or any other user constitutes acceptance of the terms under *Warranty Disclaimer, Inherent Risks of Use, and Limitation of Remedies*.

WARRANTY DISCLAIMER

SePRO Corporation warrants that the product conforms to the chemical description on the

label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, SEPRO CORPORATION MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

INHERENT RISKS OF USE

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label such as unfavorable temperatures, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of SePRO Corporation or the seller. To the extent consistent with applicable law, all such risks shall be assumed by buyer.

LIMITATION OF REMEDIES

To the extent consistent with applicable law, the exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories) shall be limited to, at SePRO Corporation's election, one of the following:

- (1) Refund of purchase price paid by buyer or user for product bought, or
- (2) Replacement of amount of product used.

To the extent consistent with applicable law, SePRO Corporation shall not be liable for losses or damages resulting from handling or use of this product unless SePRO Corporation is promptly notified of such losses or damages in writing. In no case shall SePRO Corporation be liable for consequential or incidental damages or losses.

The terms of the *Warranty Disclaimer*, *Inherent Risks of Use* and this *Limitation of Remedies* cannot be varied by any written or verbal statements or agreements. No employee or sales agent of SePRO Corporation or the seller is authorized to vary or exceed the terms of the *Warranty Disclaimer* or *Limitations of Remedies* in any manner.

© Copyright ____ SePRO Corporation

Plant Growth Regulator

Net contents _____



Exponent
1150 Connecticut Avenue, NW
Suite 1100
Washington, DC 20036

telephone 202-772-4900
facsimile 202-772-4979
www.exponent.com

December 10, 2010

Shaja Brothers-Joyner
Document Processing Desk
Office of Pesticide Programs (7504P)
U.S. Environmental Protection Agency
Room S-4900, One Potomac Yard
2777 South Crystal Drive
Arlington, VA 22202-4501

Subject: Submission of Support Documents

Dear Ms. Brothers-Joyner:

On behalf of our client, SePRO Corporation (SePRO, EPA Company Number 67690), Exponent is responding to EPA's request to submit updated data matrix and Certification with Respect to Citation of Data (EPA Form 8570-34) forms to support the following pending flurprimidol actions:

- Decision # D398756, EPA Reg. No. 67690-16 – Cutless Technical
- Decision # D398765, EPA Reg. No. 67690-15 – Cutless 50W Turf Plant Growth Regulator
- Decision # D398766, EPA Reg. No. 67690-13 – Cutless 0.33G Landscape Growth Regulator
- Decision # D398767, EPA Reg. No. 67690-19 – Turf Fertilizer – Contains Cutless 0.5%
- Decision # D398768, EPA Reg. No. 67690-44 – Turf Fertilizer – Contains Cutless 0.17%
- Decision # D398769, EPA Reg. No. 67690-46 – SP5075 Turf Growth Regulator

Please find enclosed updated data matrix and 8570-34 forms for each of the above-referenced pending actions.

If you have any questions, please contact me at 202-772-4932.

Sincerely,

James B. Messina
Authorized Representative of
SePRO Corporation

Enclosures

cc: Tyler Koschnick, SePRO



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

NOV 10 2010

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

MEMORANDUM

SUBJECT: Posting EPA-HQ-OPP-2009-0798 Regulations.gov for Public Access

TO: Office of Pesticide Programs Docket

FROM: Lois Rossi *Lois Rossi*
Director, Registration Division 11/10/10

This memorandum authorizes the posting of EPA-HQ-OPP-2009-0798 to Regulations.gov for public access.

The Agency is proposing to grant new uses of the registered active ingredient, flurprimidol, formulated as a technical product and multiple end-use products. The proposed new uses for flurprimidol are for edging/banding (liquid and granular formulations) applications to turf grass and ornamentals in commercial, municipal, and residential settings. Flurprimidol is currently registered for use on ornamental plants grown in containers in commercial greenhouses and shade houses and for use on golf course turf. There are no food uses approved for flurprimidol.

These documents will be open for public comment from November 10, 2010 to December 10, 2010.

- A. Proposed Registration of Flurprimidol on Turf Grass and Ornamentals in Residential and Non-Occupational Settings
- B. Turf Fertilizer-Contains Cutless 0.17% proposed product proposed label
- C. SP5075 Turf Growth Regulator product proposed label
- D. Turf Fertilizer-Contains Cutless 0.5% product proposed label
- E. Cutless 50W Turf Growth Regulator product proposed label
- F. Cutless 0.33G Plant Growth Regulator Fungicide product proposed label
- G. Revised Section 3 Environmental Fate and Ecological Risk Assessment of Flurprimidol Proposed for New Uses on Turf Grasses and Ornamentals

- H. Occupational and Residential Exposure/Risk Assessment of Flurprimidol for Section 3 Registration of New Uses in Residential and Non-Occupational Settings
- I. Addendum to the 10/12/ 2009 Occupational and Residential Exposure/Risk Assessment of Flurprimidol for Section 3 Registration of New Uses in Residential and Non-Occupational Settings

Submit your comments, identified by Docket ID No. EPA-HQ-OPP-2009-0798, by one of the following methods: www.regulations.gov: Follow the on-line instructions for submitting comments.

EPA's policy is that all comments received will be included in the public docket without change and may be made available online at <http://www.regulations.gov>, including any personal information provided, unless the comment includes information claimed to be Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Do not submit information that you consider to be CBI or otherwise protected through <http://www.regulations.gov> or e-mail. The <http://www.regulations.gov> Web site is an "anonymous access" system, which means EPA will not know your identity or contact information unless you provide it in the body of your comment. If you send an e-mail comment directly to EPA without going through <http://www.regulations.gov>, your e-mail address will be automatically captured and included as part of the comment that is placed in the public docket and made available on the Internet. If you submit an electronic comment, EPA recommends that you include your name and other contact information in the body of your comment and with any disk or CD-ROM you submit. If EPA cannot read your comment due to technical difficulties and cannot contact you for clarification, EPA may not be able to consider your comment. Electronic files should avoid the use of special characters, avoid any form of encryption, and be free of any defects or viruses. For additional information about EPA's public docket, visit the EPA Docket Center homepage at <http://www.epa.gov/epahome/dockets.htm>.

Should you have any questions regarding this memorandum, please contact Rose Kearns at (703) 305-5611, or via email at kearns.rosemary@epa.gov.



**Proposed Registration of Flurprimidol on Turf
Grass and Ornamentals in Residential and
Non-Occupational Settings**

**November 2, 2010
U.S. Environmental Protection Agency
Office of Pesticide Programs
Registration Division**

Proposed Registration of Flurprimidol on Turf Grass and Ornamentals in Residential and Non-occupational Settings

Approved by: Lois Rossi

**Lois Rossi, Director
Registration Division**

Date: November 2, 2010

REGULATORY PROPOSAL

The Agency is proposing to grant new uses of the registered active ingredient, flurprimidol, formulated as a technical product and multiple end-use products. The proposed new uses for flurprimidol are for edging/banding (liquid and granular formulations) applications to turf grass and ornamentals in commercial, municipal, and residential settings. Flurprimidol is currently registered for use on ornamental plants grown in containers in commercial greenhouses and shade houses and for use on golf course turf. There are no food uses approved for flurprimidol.

I. CHEMICAL INFORMATION

Chemical Name: Flurprimidol; alpha-(1-methylethyl)-alpha-[4-(trifluoromethoxy) phenyl]-5-pyrimidinemethanol

EPA PC Code: 125701

Chemical Abstracts Service (CAS) Number: 56425-91-3

Mode of Action: Flurprimidol is a plant growth regulator and reduces internode elongation of plants through the inhibition of gibberellin biosynthesis.

Registrant: Sepro Corp

Amended Products: The Agency is proposing to grant new uses of flurprimidol for the following registered products: EPA Reg. 67690-16 (Cutless Technical), EPA Reg. 67690-13 (Cutless 0.33G Landscape Growth Regulator), EPA Reg. 67690-15 (Cutless 50W Turf Growth Regulator), EPA Reg. 67690-19 (Turf Fertilizer-Contains Cutless 0.375%), EPA Reg. 67690-44 (Turf Fertilizer-Contains Cutless 0.17%), and EPA Reg. 67690-46 (SP5075 Turf Growth Regulator).

Proposed maximum single application rates range from 0.69 to 1.5 lbs. ai/acre and proposed maximum annual application rates are 3.0 lbs. ai/acre/year.

II. HUMAN HEALTH RISK

EPA evaluated the potential human health risk for exposures to flurprimidol through use on turf grass and ornamentals in commercial, municipal, and residential settings. A summary of the human health effects and risk of flurprimidol as assessed in the Agency document entitled "Flurprimidol: Occupational and Residential Exposure/Risk Assessment of Flurprimidol for Section 3 Registration of New Uses in Residential and Non-Occupational Settings" is provided below.

The Agency uses the term Margin of Exposure (MOE) to refer to the risk associated with the exposure estimate. The MOE is defined as: the dose, typically the No Observed Adverse Effects Level (NOAEL), divided by the estimated amount of human exposure. For example, an MOE of

100 means that the estimated level of human exposure is 100 times lower than the highest tested dose that produced no adverse effects in the relevant toxicology study. The greater the MOE, the lower potential for risk to humans from exposures.

The toxicology database is considered adequate and well-characterized for selecting toxicity endpoints for risk assessment. Flurprimidol has low acute toxicity, category III or IV, via all routes of exposure. It is slightly irritating to the skin (category IV), moderately irritating to the eye (category III), and is not a dermal sensitizer.

The liver and adrenal gland are the major target organs. In the rat, microscopic changes were observed in the liver following chronic exposure but not subchronic exposure. In the dog, microscopic changes and reduced size were observed in the adrenal gland following subchronic and chronic exposure. There was no evidence of increased susceptibility in developmental toxicity studies or in the rat two-generation reproductive toxicity study. In a rat developmental toxicity study, skeletal anomalies, hydronephrosis, hydroureter, and microphthalmia were observed at a dose which also caused maternal toxicity. No developmental toxicity was observed in the rabbit study at the dose that caused maternal effects. In the two-generation rat reproductive toxicity study, decreased pup survival and weights were observed at maternally toxic doses. There is no evidence that flurprimidol is neurotoxic, and the Agency classified flurprimidol as “Not likely to be a human carcinogen”. The immune system does not appear to be a target. The endpoints selected for exposure scenarios are protective of potential endocrine and developmental effects.

A. Toxicological Endpoints

1. Acute and Chronic Dietary: Dietary assessments were not required because there are no food/feed uses for flurprimidol.
2. Short-Term Incidental Oral, Dermal and Inhalation: The endpoint (i.e., toxic effect) and dose for risk assessment were selected from a rat developmental toxicity study. The endpoint was based on decreased maternal body-weight gain and food intake observed at the LOAEL (Lowest Observed Adverse Effect Level) of 45 mg/kg/day. Selection of the endpoint and dose (a NOAEL of 10 mg/kg/day) is protective of both maternal and developmental toxicity, since maternal and developmental effects were observed at the same doses.
3. Intermediate-Term Incidental Oral, Dermal and Inhalation: The endpoint and dose were selected from a 90-day dog study. The endpoint was based on adrenal histopathology and decreased adrenal weight and size, observed at the LOAEL of 30 mg/kg/day. The dose was the NOAEL of 1.5 mg/kg/day, and was the lowest dose available for the relevant routes and durations of exposure.
4. Cancer: EPA has classified flurprimidol as “Not likely to be carcinogenic to humans.” based on lack of evidence of increased tumors in rat and mice. Flurprimidol showed no evidence of genotoxicity.
5. Route-to-route Extrapolation: Since the dermal and inhalation endpoints and doses were

selected from oral studies, the Agency assumed a 6% dermal absorption rate and a 100% inhalation absorption rate, relative to oral absorption.

6. Uncertainty Factors and the Level of Concern (LOC): No uncertainty factors (UFs) were needed to account for missing data or the lack of a NOAEL, therefore a combined uncertainty factor of 100X was based on intraspecies variability (differences between individuals) and interspecies extrapolation (differences between humans and test animals). The combined UF of 100 serves as the basis for the LOC for occupational and residential risk. Therefore, MOEs greater than the LOC of 100 are not of concern.

B. FQPA

An assessment of FQPA hazard considerations was not required because there are no food/feed uses for flurprimidol.

C. Occupational Exposure and Risk

1. Handlers: Except for the intermediate-term MOE for mixing/loading liquid for ground-boom applications, all other MOEs for occupational handlers performing are greater than 100 assuming baseline clothing (i.e., single layer, no gloves), and therefore are not of concern. The short-term MOEs ranged from 170 to 16,000; where as intermediate-term MOEs ranged from 110 to 3,300. The intermediate-term MOE for mixing/loading liquids for ground-boom application was 29 assuming baseline PPE; however, the MOE increased to 2,000 at the single layer plus gloves level of mitigation. Therefore, the Agency has no concern for occupational handlers provided they wear gloves.

2. Postapplication: Based on the proposed use pattern, occupational workers will be exposed to flurprimidol when they enter treated areas to conduct maintenance activities, such as irrigation, weeding, and mowing. Except for the intermediate-term MOE for course maintenance, all other MOEs for postapplication are greater than 100, and therefore are below the Agency's level of concern. The MOEs ranged from approximately 440 to 3,000. Although the intermediate-term MOE for golf course maintenance was 66, the Agency does not consider this to be a risk of concern because the assessment assumed zero-day residues for a duration of 1 to 6 months, which is a significant overestimate of exposure.

D. Residential Exposure and Risk

1. Handlers: One of the proposed amended labels allows use by homeowners. As a result, a residential handler exposure and risk assessment was conducted. The MOEs for residential handlers applying flurprimidol ranged from 1,200 to 20,000, and therefore do not exceed the Agency's level of concern.

2. Postapplication: All postapplication MOEs for adults and children exposed to flurprimidol after application to turf were greater than the LOC of 100, and are therefore not of concern. The MOEs ranged from approximately 130 to 130,000.

E. Aggregate (Food + Water) Risk

There are no food/feed uses for flurprimidol. Based on the current use pattern, an aggregate exposure risk assessment was not required.

III. ENVIRONMENTAL RISK

EPA evaluated the potential ecological fate and risk for exposures to non-target organisms from the proposed flurprimidol uses. A summary of the environmental fate and ecological effects and risk of flurprimidol as assessed in the Agency document entitled "Section 3 Environmental Fate and Ecological Risk Assessment of Flurprimidol Proposed for New Uses on Turf Grasses and Ornamentals" is provided below.

A. Environmental Fate

Flurprimidol is stable to hydrolysis and resistant to degradation. In addition, flurprimidol is highly mobile in soil, is of moderate solubility in sterile water, and has a low potential for bioaccumulation.

1. Persistence: Flurprimidol is stable to hydrolysis and resistant to degradation in both aerobic and anaerobic terrestrial environments and is assumed to be similarly persistent in most aerobic and anaerobic aquatic environments. The half-life of flurprimidol in soil incubated under aerobic conditions was estimated to be 482 days. The aqueous photolysis half-life of flurprimidol is 1.4 days, and thus the compound is expected to degrade in clear shallow surface waters.

2. Transport: Flurprimidol is highly mobile in soil as indicated by the Freundlich K_d values ranging from 0.12 to 4.9 and the Freundlich K_{oc} ranging from 140 to 535.

3. Bioaccumulation: Based on the relatively low Log K_{ow} of 2.96, and low bioconcentration factors (BCF) ranging from 6.2x to 52.3x in a fish bioaccumulation study, flurprimidol is not expected to bioaccumulate.

To address concerns with the potential leaching of flurprimidol that may result from the persistence and mobility described above, the Agency proposes to require labels to have surface and ground water advisories that stress the potential of runoff after treatment and descriptions of conditions that may promote leaching to groundwater. Proposed label language is described more fully under "Proposed Regulatory Decision" below.

B. Ecological Risk

Ecological risk characterization integrates the results of the exposure and ecotoxicity data to evaluate the likelihood of adverse ecological effects. The means of integrating the results of exposure and ecotoxicity data is called the quotient method. For this method, risk quotients (RQs) are calculated by dividing exposure estimates by ecotoxicity values, both acute and chronic ($RQ = \text{Exposure}/\text{Toxicity}$). RQs are then compared to EPA's Level of Concern (LOC). The LOCs are criteria used by the Agency to indicate potential risk to non-target organisms. The

criteria indicate whether a pesticide, when used as directed, has the potential to cause adverse effects to non-target organisms.

The ecotoxicity endpoints derived from the results of short-term laboratory studies that assess acute effects are: (1) LC₅₀ (Lethal Concentration at which 50% of treated organisms die, fish and birds); (2) LD₅₀ (Lethal Dose at which 50% of treated organisms die, birds and mammals); (3) EC₅₀ (Environmental Concentration at which 50% of treated organisms die, aquatic plants and aquatic invertebrates) and; (4) EC₂₅ (Environmental Concentration at which 25% of treated organisms die, terrestrial plants). The endpoints derived from the results of long-term laboratory studies that assess chronic effects are the NOAEL and Lowest Observed Adverse Effect Level (LOAEL) for birds and mammals and No Observed Adverse Effect Concentration (NOAEC) and the Lowest Observed Adverse Effect Concentration (LOAEC) for fish and aquatic invertebrates. Risk presumptions along with the corresponding RQs and LOCs are shown in the table below.

Risk Presumptions for Non-target Organisms

Risk Presumption	RQ	LOC
Terrestrial Animals		
Acute High Risk	EEC*/LC50 or LD50/sqft or LD50/day	≥0.5
Acute Restricted Use	EEC/LC50 or LD50/sqft or LD50/day (or LD50 < 50 mg/kg)	≥0.2
Acute Endangered Species	EEC/LC50 or LD50/sqft or LD50/day	≥0.1
Chronic Risk	EEC/NOAEL	≥1
Aquatic Animals		
Acute High Risk	EEC/LC50 or EC50	≥0.5
Acute Restricted Use	EEC/LC50 or EC50	≥0.1
Acute Endangered Species	EEC/LC50 or EC50	≥0.05
Chronic Risk	EEC/NOAEC	≥1
Terrestrial and Semi-Aquatic Plants		
Acute High Risk	EEC/EC25	≥1
Acute Endangered Species	EEC/EC50 or NOAEC	≥1
Aquatic Plants		
Acute High Risk	EEC/EC50	≥1
Acute Endangered Species	EEC/EC50 or NOAEC	≥1

*EEC = Estimated environmental concentration

The calculated risk quotients represent a screening level assessment. Screening level assessments are based on conservative assumptions. For example, screening level assessments always assume the maximum labeled rate, the maximum number of applications, and the shortest

treatment interval between applications are always used. Screening level terrestrial risk assessments also assume that an organism is in the treated area or in adjacent areas receiving or ingesting pesticide at a rate commensurate with the treatment rate. This assumption leads to a maximum level of estimated exposure. To the extent that an organism does not reside and forage exclusively and permanently in treated areas, exposure will be less.

1. Risks to Aquatic Animals and Plants

Freshwater Fish: Minimal acute and chronic risks are expected for freshwater fish because no acute or chronic LOCs are exceeded. The acute risk quotients for turf grass and ornamentals were calculated to be <0.01 , while the chronic risk quotients were calculated to be 0.13.

Freshwater Invertebrates: Minimal acute and chronic risks are expected for freshwater invertebrates because no acute or chronic LOCs are exceeded. The acute risk quotients for turf grass and ornamentals were calculated to be <0.01 , while the chronic risk quotients were calculated to be 0.04.

Estuarine/Marine Fish: No ecotoxicity studies on estuarine/marine fish were available, therefore a quantitative estimation of risk cannot be conducted. However, it is unlikely that they would be sufficiently more sensitive than their freshwater counterparts such that Agency LOCs would be exceeded.

Estuarine/Marine Invertebrates: No ecotoxicity studies on estuarine/marine invertebrates were available, therefore a quantitative estimation of risk cannot be conducted. However, it is unlikely that they would be sufficiently more sensitive than their freshwater counterparts such that Agency LOCs would be exceeded.

Aquatic Plants: Using a Tier I exposure model, which is non-specific to crop and use-site, it was determined that risk is expected for aquatic vascular plants. The risk quotients ranged from 1.4 to 16. Minimal risk is expected for non-vascular plants, as LOCs were not exceeded. Using a Tier II exposure model, risk quotients ranged from 1.76 to 8.42 for aquatic vascular plants.

2. Risks to Terrestrial Animals and Plants

Birds: Acute toxicity data for birds when flurprimidol is applied as a banded spray to foliar surfaces suggests that flurprimidol is practically non-toxic to birds. In addition, risk is expected to be minimal for birds foraging on flurprimidol granules.

The Agency does not have a standard methodology for assessing chronic risk to birds from banding/edging applications. However, the Agency modeled the chronic risk to birds for the original application that included liquid broadcast applications (this proposed application method was later withdrawn). When assuming the maximum exposure scenario (0.75 lb ai/A applied four times with a 2-week reapplication interval), the LOC is exceeded with a chronic risk quotient of 1.6. Although there is an exceedance of the chronic LOC the potential risk for adverse effects to growth and reproduction is based on the assumption that birds occupy the area permanently and are feeding on short grass exclusively within the treated areas where turfgrasses

are grown. To the extent that those birds do not reside permanently within the treated area, exposure will be less and risk is presumably less. In addition there were no LOC exceedances when using mean EECs. The risks to birds from banding/edging applications will be less compared to the risks from the modeled broadcast applications because the likelihood of a bird coming into contact with a treated area from a banding/edging application will be lower than a treated area from a broadcast application.

Mammals:

Acute Toxicity; Banded Spray to Ground Surfaces

Acute toxicity data indicate that mammals of all weight classes may be at risk for adverse effects to survival from acute exposure to flurprimidol as a result of banded spray applications to ground surfaces. The risk quotients ranged from 0.1 to 0.31.

Acute Toxicity; Banded Granular Application to Ground Surfaces

Acute toxicity data indicate that small- and medium-sized mammals may be at risk for adverse effects to survival from acute exposure to flurprimidol as a result of granular applications. The RQs ranged from 0.03 to 0.67.

Chronic Toxicity

Chronic risks to mammals from banded/edging applications were not estimated due to model limitations. The Agency modeled the chronic risk to mammals for the original application that included liquid broadcast applications (this proposed application method was later withdrawn). Assuming one of two exposure scenarios (0.75 lb ai/acre, 4 applications with 2-week intervals and 0.26 lb ai/acre, 12 applications with 2-week intervals) LOCs were exceeded for all weight classes for short grass, tall grass and broadleaf/small insects. The risk quotients ranged from 6.76 to 29.60 for short grass, 3.10 to 13.57 for tall grass, and 3.80 to 16.65 for broadleaf plants/small insects.

The following chronic exposure estimation and risk characterization (broadcast application) for mammals considers granular routes of exposure including direct ingestion of soil invertebrates that have bio-concentrated flurprimidol residues of granules in the soil. Based on the highest EEC of flurprimidol in earthworm tissue and the lowest mammalian NOAEC, the chronic LOC is not exceeded and is 2860 times lower than the modeled EEC for insectivorous mammals exposed to flurprimidol granules via ingestion of earthworms at the highest application rate.

Exposure to mammals from banded/edging applications will be lower than modeled broadcast applications; therefore risk will be presumably less.

Amphibians and Reptiles:

The Agency currently uses surrogate avian data to assess acute and chronic risk to terrestrial-phase amphibians and reptiles. Risk to terrestrial-phase amphibians and reptiles are similar to

birds.

Beneficial Insects (Honey Bees): Available terrestrial insect toxicity data, based on tests with honey bees, suggest that flurprimidol is practically non-toxic to bees on an acute contact basis. The LD₅₀ value was >100 µg ai/bee. Risk to beneficial insects in the direct treatment area exposed to flurprimidol is expected to be minimal.

Soil-dwelling Invertebrates (Earthworms): Available acute toxicity data indicate flurprimidol is practically non-toxic to soil-dwelling invertebrates on an acute basis. The LD₅₀ value was >100 µg ai/kg. Risk is expected to be minimal for soil-dwelling invertebrates burrowing soils with flurprimidol residues.

Terrestrial Plants: Available terrestrial plant toxicity data indicate that monocots and dicots inhabiting terrestrial and semi-aquatic areas would be at risk for adverse effects to growth and development when exposed to flurprimidol. Specifically, seedling emergence and vegetative vigor are impacted. The risk quotients ranged from 1.3 to 340.9.

Flurprimidol Benefits

Flurprimidol is a plant growth regulator (PGR) that belongs to the pyrimidine class of chemicals. The active ingredient works through inhibition of gibberellin biosynthesis, which prevents the synthesis of numerous gibberellins needed for normal plant growth and development. The use of PGRs is intended to offer time and labor savings to homeowners, as well as aesthetic functions for landscapes. Plant growth regulators have been used commercially on turf and ornamental sites to inhibit plant growth or seed production in order to reduce costs and maintain desired plant shapes. On commercial turf grass and golf courses, PGRs are used to slow the growth of turf grass in order to reduce time and labor costs of mowing and edging. On ornamental shrubs and ground cover plants, PGRs are used by nurseries and commercial landscapers to reduce pruning costs and for aesthetic purposes of maintaining compact or desirable shapes.

There are four PGR active ingredients currently registered and labeled for residential use. As PGRs, these products provide similar, although not necessarily identical, results as flurprimidol. These products are applied to plants as liquid sprays. The proposed flurprimidol new uses are comprised of multiple products formulated as soluble concentrates, emulsifiable concentrates, and granular formulations. None of the other PGR products that currently have residential uses are in granular form. Approving the proposed new uses for flurprimidol will provide applicators and homeowners with a new PGR formulation which can be used as a tool for improving the quality of turf grass and ornamentals in residential and non-occupational settings.

Proposed Regulatory Decision

The Agency is proposing to grant new uses of the active ingredient, flurprimidol, formulated as a technical product and multiple end-use products, for application to turf grass and ornamentals in commercial, municipal, and residential settings under FIFRA 3c7B. The Agency published a notice of receipt (NOR) of applications in the *Federal Register* (January 27, 2010) for new uses of flurprimidol. No comments were received.

The Occupational and Residential Exposure/Risk Assessment was completed on October 12, 2009 and concluded that the proposed new uses did not exceed the Agency's level of concern. Based on lack of evidence of neurotoxicity or immunotoxicity and use of oral studies for route-to-route extrapolation for inhalation exposure assessment, the database was considered adequate for purposes of the assessment and an additional database uncertainty factor (UF_{DB}) was not applied for the lack of these studies. However, in accordance with the revised 40 CFR part 158, the following studies are required to satisfy toxicological data requirements:

- 1) rat acute and subchronic neurotoxicity studies
- 2) immunotoxicity study
- 3) rat 28-day inhalation toxicity study

The Environmental Fate and Ecological Risk Assessment was completed on June 9, 2010 and concluded that the flurprimidol database is largely complete. In addition, the assessment did not indicate any data gaps or deficiencies that would require conditions of registration.

In order to mitigate risks to non-target organisms, the registrant has limited the proposed application methods to banding/edging. This will dramatically reduce the amount of area being treated from the originally proposed broadcast application and will ensure that the pesticide remains on the intended treatment area, and thereby reducing the potential for exposure to non-target organisms. In addition the Agency proposes to require the use of surface water advisories (as described above in section A. Environmental Fate) and an Environmental Hazards warning that will be required on all labeling, which may further reduce possible exposure to non-target organisms. For the reasons described in the Ecological Risk section above, exposure will likely be less than actually modeled for birds, mammals, reptiles, and terrestrial amphibians.

The Agency proposes to require the following labeling revisions:

All Labels

Environmental Hazards:

Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean water mark. Do not contaminate water when disposing of rinseate or washwater.

Ground Water Advisory:

This pesticide has properties and characteristics associated with chemicals detected in ground water. This chemical may leach into ground water if used in areas where soils are permeable, particularly where the water table is shallow.

Surface Water Advisory:


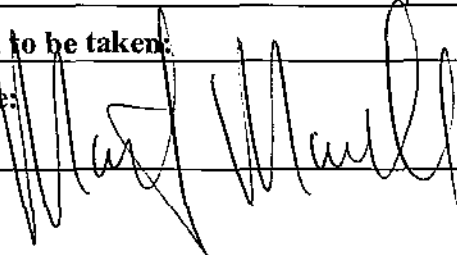
This product is classified as having a potential for reaching surface water via runoff. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs, will reduce the potential loading of flurprimidol from runoff and sediment.

Personal Protective Equipment (PPE)



Some materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for Category A on an EPA chemical resistance category selection chart.

Mixers, loaders, applicators, and other handlers must wear the following:

- Chemical-resistant gloves

Recommendation of Division Directors Negotiated Due Dates		
Decision#: 398756, 398768, 398767, 398765, 398769, 398766	Registration#: 67690-16, 67690- 19 67690-44, 67690-15, 67690-46 and 67690-13	Petition #: N/A
Fee Category: R230		PRIA Decision Time Frame: 15 months
Submitted by: Rose Mary Kearns	Branch: Fungicide	Date
Company: Sepro Corporation		
Original Due Date: November 27, 2009	Proposed New Due Date: December 30, 2010	
Previous Negotiated Due Dates June 30, 2010, September 30, 2010, November 30, 2010		
Is the "Fix" in-house? YES	If not, date "Fix" expected: N/A	
Issue (describe in detail) Additional time is needed for the comment period for public process because the comment period (12-7-2010) exceeds the current PRIA due date of 11-30-2010. The registrant was also advised that new data matrices were needed. RD also needs the additional time to complete the registration.		
Summary of Deficiency Type(s): Not Submitted (N) Deficiencies (D) Product Chemistry: ___ Acute Tox: ___ Efficacy: ___ Labeling: ___ Other (describe): ___		
Describe Interactions with Company (describe when contacted and company's response including response to previous negotiated due dates): Shaja Joyner, PM 20 contacted the registrant on November 24, 2010 to request an extension and registrant agreed to the December 30, 2010 extension, by providing a letter on November 29, 2010.		
"75 Day" Letter sent? ___ (Date sent) Yes ___ No and reason for none? No..		
Rationale for Proposed Due Date:		
Registrant notified that this is the last negotiation? Yes ___ X ___ Not Applicable		
Approve: 	Disapprove:	
If disapproved, action to be taken:		
OD or DOD Signature: 	Date: 11-30-10	

**Recommendation of Division Directors
Negotiated Due Dates**

Decision#: 398756, 398768, 398767, 398765, 398769, and 398766		Registration#: 67690-13, 67690-15, 67690-16, 67690-19, 67690-44, and 67690-46		Petition #: N/A	
Fee Category: R230			PRIA Decision Time Frame: 15 months		
Submitted by: Erik Kraft / Cynthia Giles-Parker			Branch: Fungicide		Date: Sept. 20, 2010
Company: Sepro Corporation					
Original Due Date: November 27, 2009			Proposed New Due Date: November 30, 2010		
Previous Negotiated Due Dates June 30, 2010 and September 30, 2010					
Is the "Fix" in-house? YES			If not, date "Fix" expected: N/A		
Issue (describe in detail): EFED issued their risk assessment on 5-6-10. A copy of the decision document was routed to HED, EFED, and OGC on 5-19-10. In the EFED risk assessment acute and chronic risks to mammals were identified. RD spent 5-19-10 to 6-15-10 working with EFED to refine the risks and modeling. EFED issued a revised risk assessment on 6-9-10. The refined risk assessment still identified chronic risks to mammals. Erik Kraft and Jeff Herndon contacted the registrant on 6-15-10 to mitigate the risks to mammals and discuss the outstanding issues. The registrant agreed to submit in new information to help clarify the issue. On 9-17-10 the registrant agreed to remove all the new broadcast uses and only keep the new edging/banding uses. By doing this, there is no longer a chronic risk to mammals.					
Summary of Deficiency Type(s): Not Submitted (N) Deficiencies (D) Product Chemistry: ___ Acute Tox: ___ Efficacy: ___ Labeling: ___ Other (describe): <u>X</u> (Outstanding Eco Risk)					
Describe Interactions with Company (describe when contacted and company's response including response to previous negotiated due dates): From 6-15-10 to 9-17-10 Erik Kraft has been working with the registrant and EFED to mitigate the chronic risks to mammals. On 9-17-10 the registrant was persuaded to remove the proposed new broadcast uses and only keep the proposed new banding/edging treatments (this was the only option for the registrant without withdrawing the action). By doing this, there is no longer a chronic risk to mammals, as the chronic risk was triggered by broadcast applications.					
"75 Day" Letter sent? ___ (Date sent) Yes ___ No and reason for none? No (NA)					
Rationale for Proposed Due Date: RD will need an additional 60 days so that the action can go through the public process. This includes reviewing new labels and having enough time for the action to go through the public process.					
Registrant notified that this is the last negotiation? Yes ___ X Not Applicable					
Approve: 			Disapprove:		
If disapproved, action to be taken:					
OD or DOD Signature: 				Date: 9.29.10	



To:
Cc:
Bcc:
Subject: Fw: flurprimidol PRIA extension - Decision Numbers D398756, D398765, D398766, D398767, D398768, and D398769

From: "Dugger-Ronyak, Amy" <amyd@sepro.com>
To: Erik Kraft/DC/USEPA/US@EPA
Cc: <jmessina@exponent.com>, "Koschnick, Tyler" <tylerk@sepro.com>
Date: 06/23/2010 04:17 PM
Subject: RE: flurprimidol PRIA extension - Decision Numbers D398756, D398765, D398766, D398767, D398768, and D398769

Erik,

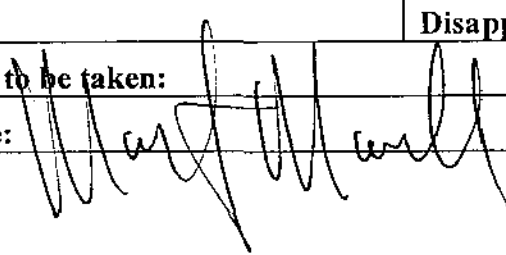
SePRO Corporation agrees to a PRIA extension through September 30/October 1, 2010 for EPA Decision numbers D398756, D398765, D398766, D398767, D398768, and D398769. If at any time during this extension period EPA has questions that would facilitate a faster review/posting of this action, please contact me.

Thank you for all your help with working through this action. It is very important to SePRO.

Best Regards,

Amy Dugger-Ronyak, Regulatory Affairs Specialist
SePRO Corporation | 11550 N. Meridian St., Ste. 600 | Carmel, IN 46032 USA
317-580-8286 (phone) 317-388-3334 (fax)
amyd@sepro.com

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Recommendation of Division Directors Negotiated Due Dates		
Decision#: 398756, 398768, 398767, 3978765, 398769, 398766	Registration#: 67690-16, 67690-44, 67690-19, 67690-15, 67690-46, 67690-13	Petition #: N/A
Fee Category: R230		PRIA Decision Time Frame: 15 Months
Submitted by: Cynthia Giles-Parker		Branch: Fungicide Date: 2/12/2010
Company: Sepro Corporation		
Original Due Date: November 27, 2009		Proposed New Due Date: June 30, 2010
Previous Negotiated Due Dates: January 11, 2010, February 11, 2010		
Is the "Fix" in-house? Yes		If not, date "Fix" expected:
<p>Issue (describe in detail): The Agency met with the Sepro Corporation and their Agent, James Messina to discuss the approved rates and risk assessments previously conducted by EFED. The Agency determined that a new assessment is needed to take into consideration the proposed label rates, new data and clear description of the proposed use sites. The company will provide new labels with the correct rates, use sites and discussion of the use areas for consideration in our review. Additional time is required to prepare a risk assessment (EFED), review new data and open the 30-day comment period during the Public Process.</p>		
<p>Summary of Deficiency Type(s): Not Submitted (N) Deficiencies (D)</p> <p>Product Chemistry: Acute Tox: Efficacy: Labeling: <u> x </u> Other?: (See issue above.)</p>		
<p>Describe Interactions with Company (describe when contacted and company's response including response to previous negotiated due dates) On December 14, the Agency (Lois Rossi, Cynthia Giles-Parker and Shaja Joyner) met with the company to discuss the need for the Public Comment Process. On December 16, the registrant sent back a response to the meeting. Several emails transpired between Shaja Joyner, Cynthia Giles-Parker and the registrants to discuss pending issues with the submissions. Again on February 3, 2010, the company representative and their Agent, met with Lois Rossi, Jeff Herndon, Cynthia Giles-Parker and Shaja Joyner to discuss the risk assessments conducted by HED and to discuss the next steps for delivery of the EFED risk assessment. The company will provide new labels and a discussion of the use patterns for consideration in our review. Once the assessment has been completed, the proposed decision will be placed in the Docket and opened for public review under the new Public Process.</p>		
<p>"75 Day" Letter sent? (Date sent) No and reason for none?</p>		
<p>Rationale for Proposed Due Date: Additional time is required to review data, prepare EFED risk assessment, and open Docket for the 30-day comment period during the Public Process.</p>		
<p>Registrant notified that this is the last negotiation? Yes <u> x </u> Not Applicable</p>		
<p>Approve: <u> ✓ </u></p>		<p>Disapprove:</p>
<p>If disapproved, action to be taken:</p>		
<p>OD or DOD Signature: </p>		<p>Date: <u> 2-12-10 </u></p>

Revised May 2007



To:
Cc:
Bcc:
Subject: SePRO Information

Cynthia,

On behalf of my client, SePRO Corporation (EPA Company Number), Exponent is agreeing to a new PRIA due date of June 30, 2010 for the following pending actions:

- I. Decision # D398756, EPA Reg. No. 67690-16 – Cutless Technical
- II. Decision # D398765, EPA Reg. No. 67690-15 – Cutless 50W Turf Plant Growth Regulator
- III. Decision # D398766, EPA Reg. No. 67690-13 – Cutless 0.33G Landscape Growth Regulator
- IV. Decision # D398767, EPA Reg. No. 67690-19 – Turf Fertilizer – Contains Cutless 0.5%
- V. Decision # D398768, EPA Reg. No. 67690-44 – Turf Fertilizer – Contains Cutless 0.17%
- VI. Decision # D398769, EPA Reg. No. 67690-46 – SP5075 Turf Growth Regulator

As discussed during our meeting with EPA on February 3, 2010, SePRO's preference is for the Agency to review all of the products and assess them in appropriate risk assessments. Based on our meeting it is our understanding that the Agency anticipates it can complete all of the pending actions and approve them by the end of June 2010.

SePRO is preparing a support paper related to the maximum and typical application rates for each of the above-referenced products. We plan to provide this to EPA for its reference in the next two weeks. Additionally, we have updated the product labels to clarify a few sections and will email PDFs of the updated labels to EPA in the next two weeks. Please note none of the updates affects application rates or use patterns, they simply clarify existing use patterns. The following summarizes the updates SePRO is seeking:

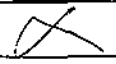

- Cutless 0.33G (67690-13)
 - Add language that clarifies the use to include ornamentals grown in container and field nurseries (right now the label states "landscape ornamentals") by professional applicators.
 - Highest single application rate for this type of use is 1.5 lbs ai/A as a broadcast application.
- Turf Fertilizer – Contains Cutless 0.17% (67690-44)
 - Add language to clarify use on landscape ornamentals (similar to what was submitted to EPA for 67690-19 and is under review with EPA), plus adding language allowing for use on container and field grown ornamentals. This is not a new use for flurprimidol as ornamentals are already approved by EPA.
 - This label would also be formatted as a split label (it isn't currently).

If you have any questions, please contact me.

Best Regards,

James Messina
Senior Managing Regulatory Consultant
Exponent
Center for Chemical Regulation and Food Safety
1150 Connecticut Avenue, N.W.
Suite 1100
Washington, DC 20036
202-772-4932
202-772-4979 fax
301-908-1181 cell

Recommendation of Division Directors Negotiated Due Dates		
Decision#: 398756, 398768, 398767, 398765, 398769, 398766	Registration#: 67690-16, 67690-44, 67690-19, 67690- 15, 67690-46, 67690-13	Petition #: NA
Fee Category: R230	PRIA Decision Time Frame: 15 months	
Submitted Shaja Joyner	Branch: RD/FB	Date: 11/25/09
Company: Sepro Corporation		
Original Due Date: November 27, 2009		Proposed New Due Date: January 11, 2010
Previous Negotiated Due Dates: None		
Is the "Fix" In-house? Yes		If Not, Date "Fix" Expected:
Issue (describe in detail): The pending PRIA decisions have been identified as a "First" Residential Use, and were therefore considered as candidates for the Public Comment Process. Flurprimidol is currently registered for commercial turf grass. However, it was subsequently noted by HED that residential turf was previously incorporated into the risk assessment at that time when commercial turf was established (awaiting confirmation). A decision is pending with upper management as to whether or not these actions will be subject to the public comment process. The registrant vehemently opposes the Agency's decision to require the pending PRIA actions to undergo the Public Comment Process since they were submitted prior to the policy's implementation. Thus the registrant has only granted a maximum timeline of a 45 day extension.		
Summary of Deficiency Types(s): Not Submitted (N) Deficiencies (D) Product Chemistry: ____ Acute Tox: ____ Efficacy: ____ Labeling ____ Other (describe): __X (See issue above)		
Describe Interactions with Company (describe when contacted and company's response including response to previous negotiated due dates): The Registration Manager (Amy Dugger-Ronyak) was contacted via voicemail and email on November 17 th . She was out of the office, and did not return until Monday, Nov. 23 rd as indicated by her voicemail. A call was returned on Tuesday, Nov. 24 th to Rose Kearns and Shaja Joyner for further discussion. Although the registrant is not in favor or renegotiating for the required time of the Public Comment Process, a letter was submitted via email on the evening of Nov. 24 th for a 45 day extension.		
Was a "75-day Letter" Sent? Not Applicable		
Rationale for Proposed Due Date: The additional time is adequate to complete label reviews should it be determined that the pending PRIA actions are not subject to the Public Comment Process.		

Registrant Notified That This is the Last Negotiation?	
Yes No <input checked="" type="checkbox"/> Not Applicable	
Approve: 	Disapprove:
If disapproved, action to be taken:	
OD or DOD Signature: 	Date: 11/25/09



SePRO Corporation • 11550 North Meridian Street • Suite 600 • Carmel, Indiana 46032-4565
Phone: (317) 580-8282 Fax: (317) 428-4577

Submitted via Email

November 24, 2009

Ms. Shaja Joyner, PM 20
Document Processing Desk (REGFEE)
Office of Pesticide Programs (7504P)
U.S. Environmental Protection Agency
Room S-4900, One Potomac Yard
2777 South Crystal Drive.
Arlington, VA 22202-4501

Re: EPA Request for Renegotiation of PRIA Date

- Decision # D398756, EPA Reg. No. 67690-16 – Cutless Technical
- Decision # D398768, EPA Reg. No. 67690-44 – Turf Fertilizer – Contains Cutless 0.17%
- Decision # D398767, EPA Reg. No. 67690-19 – Turf Fertilizer – Contains Cutless 0.5%
- Decision # D398765, EPA Reg. No. 67690-15 – Cutless 50W Turf Plant Growth Regulator
- Decision # D398769, EPA Reg. No. 67690-46 – SP5075 Turf Growth Regulator
- Decision # D398766, EPA Reg. No. 67690-13 – Cutless 0.33G Landscape Growth Regulator

Dear Ms. Joyner:

With regard to EPA's request to extend the PRIA timeline for the above Decision numbers by 120 days (4 months) from the 11/27/2009 PRIA date, SePRO is willing to negotiate an extension thru January 11, 2010.

As previously indicated in an email dated 11/23/2009 to you and Ms. Rose Kearns, the original submission was timed and planned out more than 2 years ago with a plan to bring these new product concepts to market in the first quarter 2010. A 120 day extensions beyond the original PRIA date would effectively eliminate these products from the market for the next year due to the time it would subsequently take to obtain state registrations and taking into account the use season (spring/early summer).

While SePRO understands EPA's new policy/mandate with regard to transparency and public comments, it is inappropriate to delay these pending PRIA actions as a result of this new policy. PRIA actions that were established prior to the new public comment policy/mandate



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should be grandfathered in under EPA's old policies/practices as registrant's business plans and submissions were made with regard to these practices.

EPA's new policy/mandate with regard to transparency and public comments was itself established without transparency or allowing for registrants to comment and/or address concerns that may arise from this new policy/mandate, specifically how EPA would handle PRIA actions that were already under review with the Agency. This new policy/mandate was adopted in a manner inconsistent with EPA's previous commitment to not adopt significant new policies without prior notice and comment and goes against Pesticide Registration Notice 2003-3, known as the "Policy on Policies".

SePRO has historically and will continue to strive to work with EPA toward meeting both our and the Agency's goals regarding registration actions. As such, we agree to an extension thru January 11, 2010. However, any further delay in the PRIA date for the above Decision numbers will irreparably and negatively affect SePRO's business for all 6 of these products for the next calendar year.

No comments to the new proposed label changes have been made to the public docket at this time; it is highly unlikely any will be made. With this in mind, and providing no comments are made, SePRO reiterates our request that EPA approve these Decision numbers by the newly negotiated PRIA date of January 11, 2010.

If you have any questions regarding this submission, please contact me at 317-580-8286 or amvd@sepro.com.

Best regards,

A handwritten signature in cursive script that reads "Amy Dugger-Ronyak".

Amy Dugger-Ronyak
Regulatory Affairs Specialist

Enclosure (1) "CropLife America Letter to EPA from Jay Vroom"



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

OFFICE OF
CHEMICAL SAFETY AND
POLLUTION PREVENTION

MEMORANDUM

Date: June 18, 2010

Subject: **Flurprimidol:** Addendum to the 10/12/2009 Occupational and Residential Exposure/Risk Assessment of Flurprimidol for Section 3 Registration of New Uses in Residential and Non-Occupational Settings.

PC Code: 125701

DP Barcode: D375393

MRID No.:

Registration No.: 67690-16

Petition No.: NA

Regulatory Action: Section 3 Registration

Assessment Type: ORE

Reregistration Case No.: None

TXR No.: None

CAS No.: 56425-91-3

Decision No.: 398756

40 CFR: NA

TO: Rosemary Kearns/Tony Kish (RM22)
Registration Division (7505P)
Office of Pesticide Programs

FROM: Shih-Chi Wang, Biologist
Risk Assessment Branch 2
Health Effects Division (7509P)

THRU: Christina Swartz, Chief
Risk Assessment Branch 2
Health Effects Division (7509P)

HED completed an evaluation of occupational and non-dietary residential exposures associated with the use expansion of the plant growth regulator, flurprimidol, on turf (S. Wang, D357307, 10/12/2009). Risks associated with the proposed use expansion to allow use on residential turf and to allow use by residential handlers were not of concern. After the assessment was completed, HED was requested to clarify/justify the use of ORETF (Occupational and Residential Exposure Task Force) data in the assessment, since the registrant, Sepro Corp., is not a member of the Task Force. The registrant suggested that PHED (Pesticide Handlers Exposure Database) unit exposures would be appropriate for use in the assessment, and are also publicly available and therefore not subject to data compensation.

This addendum presents revised exposure and risk associated with the proposed use expansion of flurprimidol on residential turf, previously assessed by HED (S. Wang, 10/12/2009, D357307). The

addendum has been completed to incorporate the correct unit exposures for the scenarios using ORETF (Occupational and Residential Exposure Task Force) data, and to address the use of task force data versus the use of data and unit exposures from the Pesticide Handlers Exposure Database (PHED).

CONCLUSIONS

Revised Exposure and Risk Estimates

For the revised risk estimates, the exposures resulting from Scenarios 6, 7 and 8 in the 10/2009 memo were re-evaluated based on the correct/updated ORETF unit exposures. The short-term MOEs for these scenarios are 1,800, 16,000 and 2,800, respectively, and the intermediate-term MOEs for these scenarios are 310, 2,800, and 490, respectively. These MOEs are captured in the attached Tables 1 and 2. Further, based on the revised values, Tables 9 and 10 from the 10/2009 document should be replaced with Tables 3 and 4 of this addendum.

Use of Task Force Data in the ORE Assessment

To assess the proposed use expansion, HED used a combination of data sources, including the ORETF data, PHED data, and a chemical-specific study to determine risks for occupational and residential handlers. Specifically, for residential handlers, HED used the ORETF unit exposures for mixing/loading/applying granules with a push-type spreader. For occupational handlers, HED used the ORETF unit exposures to assess mixer/loader/applicator risks for scenarios including use of a handgun to apply liquids and wettable powders, and for workers applying granules with a push-type spreader. In an assessment submitted by the registrant, MRID 47510001, chemical-specific and PHED unit exposures were used to assess all occupational and residential handlers' exposures. In a letter dated 12/16/2009, the registrant, SePRO Corp., objected to the Agency's use of Task Force data, since they are not a member of the ORETF and would not be in a position to provide compensation. Further, they maintained that the risks are not of concern with the use of chemical-specific and PHED data.

The study conducted by the ORETF for the push-type granular spreader involved 20 individual participants recruited from local garden clubs whereas the PHED study involved repeated measures of 6 participants for a total of 15 measurements of dermal and inhalation exposure. In addition, the PHED study relied on some study personnel recruited as study participants, which is unacceptable based on current standards. The use of study personnel, coupled with more independent measures in the ORETF data, was the reason HED relied on the ORETF data for the push-type spreader. In general, HED's policy is to use the most reliable data available for each scenario. Often HED determines which data are the most reliable based on the study designs, and for some scenarios the Task Force data are superior to those in PHED based on the use of whole-body dosimetry, and the much higher quality QA/QC aspects regarding field fortifications and limits of quantification. Another consideration is the use of repeat measurements of subjects to develop each scenario. However, HED does concur with SePRO Corp. regarding the safety finding. Regardless of the source of unit exposures, ORETF, PHED and chemical-specific data where appropriate, the risks associated with the proposed use expansion are not of concern.

Table 1. Revised Short-Term Non-Cancer Risk for Occupational Handlers.

Exposure Scenario (Scenario #)	Mitigation Level ^a	Dermal Unit Exposure ^b (mg/lb ai)	Inhalation Unit Exposure ^c (µg/lb ai)	Crop	Application Rate (lb ai/A)	Amount Treated ^d (A/day)	Daily Dermal Dose ^e (mg/kg/day)	Daily Inhalation Dose ^f (mg/kg/day)	Combined Daily Dose ^g (mg/kg/day)	MOE ^h
Mixer/Loader/Applicator										
Wettable Powder (WSP) with Handgun (6)	Single layer +gloves	0.64 (ORETF)	7.2 (ORETF)	Turf	1.5	5	0.0048	0.0009	0.0057	1,800
Liquid with Handgun (7)	Single layer +gloves	0.45 (ORETF)	1.8 (ORETF)	Turf	0.26	5	0.00059	0.000039	0.000629	16,000
Granules with Push-Type Spreader (8)	long pants short sleeve	0.35 (ORETF)	7.3 (ORETF)	Turf	1.5	5	0.00263	0.00091	0.00354	2,800

a Baseline consists of long-sleeve shirt, long pants, shoes, and socks and no respirator. PPE consists of long-sleeve shirt, long pants, shoes, socks, chemical-resistant gloves, and no respirator.

b Baseline Dermal Unit Exposure represents long pants, long sleeved shirt, no gloves, open mixing/loading, and open cab tractors, as appropriate.

c Baseline Inhalation Exposure represents no respiratory protection, open mixing/loading, and open cab tractors, as appropriate.

d Daily acres treated values are from EPA estimates of acreage that could be treated or volume handled in a single day for each exposure scenario of concern, based on the application method and formulation/packaging type.

e Daily dermal dose (mg/kg/d) = [unit dermal exposure (mg/lb ai) * dermal absorption (0.06) * application rate (lb ai/acre) * daily acres treated / body weight (60 kg).

f Daily inhalation dose (mg/kg/d) = (unit exposure (µg/lb ai) * (1mg/1000 µg) conversion * application rate (lb ai/acre) * daily acres treated / body weight (60 kg).

g Combined daily dose = daily dermal dose + daily inhalation dose.

h MOE = NOAEL (10 mg/kg/d) / combined daily dose. UF = 100.

Table 2. Revised Intermediate-Term Non-Cancer Risk for Occupational Handlers.

Exposure Scenario (Scenario #)	Mitigation Level ^a	Dermal Unit Exposure ^b (mg/lb ai)	Inhalation Unit Exposure ^c (µg/lb ai)	Crop	Application Rate (lb ai/A)	Amount Treated ^d (A/day)	Daily Dermal Dose ^e (mg/kg/day)	Daily Inhalation Dose ^f (mg/kg/day)	Combined Daily Dose ^g (mg/kg/day)	MOE ^h
Mixer/Loader/Applicator										
Wettable Powder (WSP) with Handgun (6)	Single layer +gloves	0.64 (ORETF)	7.2 (ORETF)	Turf	1.5	5	0.00411	0.00077	0.00488	310
Liquid with Handgun (7)	Single layer +gloves	0.45 (ORETF)	1.8 (ORETF)	Turf	0.26	5	0.00050	0.000033	0.000533	2,800
Granules with Push-Type Spreader (8)	long pants short sleeve	0.35 (ORETF)	7.3 (ORETF)	Turf	1.5	5	0.00225	0.00078	0.003032	490

a Baseline consists of long-sleeve shirt, long pants, shoes, and socks and no respirator. PPE consists of long-sleeve shirt, long pants, shoes, socks, chemical-resistant gloves, and no respirator.

b Baseline Dermal Unit Exposure represents long pants, long sleeved shirt, no gloves, open mixing/loading, and open cab tractors, as appropriate.

c Baseline Inhalation Exposure represents no respiratory protection, open mixing/loading, and open cab tractors, as appropriate.

d Daily acres treated values are from EPA estimates of acreage that could be treated or volume handled in a single day for each exposure scenario of concern, based on the application method and formulation/packaging type.

e Daily dermal dose (mg/kg/d) = [unit dermal exposure (mg/lb ai) * dermal absorption (0.06) * application rate (lb ai/acre) * daily acres treated / body weight (70 kg).

f Daily inhalation dose (mg/kg/d) = (unit exposure (µg/lb ai) * (1mg/1000 µg) conversion * application rate (lb ai/acre) * daily acres treated / body weight (70 kg).

g Combined daily dose = daily dermal dose + daily inhalation dose.

h MOE = NOAEL (1.5 mg/kg/d) / combined daily dose. UF = 100.

Table 3. Short-term Non-Cancer Risk for Occupational Handlers.

Exposure Scenario (Scenario #)	Mitigation Level ^a	Dermal Unit Exposure ^b (mg/lb ai)	Inhalation Unit Exposure ^c (µg/lb ai)	Crop	Application Rate (lb ai/A)	Amount Treated ^d (A/day)	Daily Dermal Dose ^e (mg/kg/day)	Daily Inhalation Dose ^f (mg/kg/day)	Combined Daily Dose ^g (mg/kg/day)	MOE ^h
Mixer/Loader										
Wettable Powder (WSP) for Ground-boom for ground-boom (1)---a	Single layer no gloves	0.021 (PHED)	0.24 (PHED)	Turf	1.5	80	0.00252	0.00048	0.003	3,300
Wettable Powder (WSP) for Ground-boom for ground-boom (1)---b	long pants short sleeve	0.0227 (Day 1987)	0.726 (Day 1987)	Turf	1.5	80	0.002724	0.001452	0.004176	2,400
Liquid for Ground-boom (2)	Single layer no gloves	2.9 (PHED)	1.2 (PHED)	Turf	0.26	80	0.06032	0.000416	0.060736	170
Granules for Tractor-Drawn Spreader (3)	Single layer no gloves	0.0084 (PHED)	1.7 (PHED)	Turf	1.5	80	0.001008	0.0034	0.004408	2,300
Applicator										
Sprays with Ground-boom (4)---a	Single layer no gloves	0.014 (PHED)	0.74 (PHED)	Turf	1.5	80	0.00168	0.001479	0.003159	3,200
Sprays with Ground-boom (4)---a	Single layer no gloves	0.014 (PHED)	0.74 (PHED)	Turf	0.26	80	<0.00168	<0.001479	<0.003159	>3,200
Sprays with Ground-boom (4)---b	long pants short sleeve	0.0639 (Day 1987)	0.455 (Day 1987)	Turf	1.5	80	0.00768	0.000909	0.008589	1,200
Sprays with Ground-boom (4)---b	long pants short sleeve	0.0639 (Day 1987)	0.455 (Day 1987)	Turf	0.26	80	<0.00768	<0.000909	<0.008589	>1,200
Granules with Tractor-Drawn Spreader (5)	Single layer no gloves	0.0099 (PHED)	1.2 (PHED)	Turf	1.5	80	0.001188	0.0024	0.003588	2,800
Mixer/Loader/Applicator										
Wettable Powder (WSP) with Handgun (6)	Single layer +gloves	0.64 (ORETF)	7.2 (ORETF)	Turf	1.5	5	0.0048	0.0009	0.0057	1,800
Liquid with Handgun (7)	Single layer +gloves	0.45 (ORETF)	1.8 (ORETF)	Turf	0.26	5	0.00059	0.000039	0.000629	16,000
Granules with Push-Type Spreader (8)	long pants short sleeve	0.35 (ORETF)	7.3 (ORETF)	Turf	1.5	5	0.00263	0.00091	0.00354	2,800
Granules with Belly-Grinder (9)	Single layer no gloves	10 (PHED)	62 (PHED)	Turf	1.5	1	0.015	0.001545	0.016545	600

a Baseline consists of long-sleeve shirt, long pants, shoes, and socks and no respirator. PPE consists of long-sleeve shirt, long pants, shoes, socks, chemical-resistant gloves, and no respirator.

b Baseline Dermal Unit Exposure represents long pants, long sleeved shirt, no gloves, open mixing/loading, and open cab tractors, as appropriate.

c Baseline Inhalation Exposure represents no respiratory protection, open mixing/loading, and open cab tractors, as appropriate.

d Daily acres treated values are from EPA estimates of acreage that could be treated or volume handled in a single day for each exposure scenario of concern, based on the application method and

formulation/packaging type.

e Daily dermal dose (mg/kg/d) = {unit dermal exposure (mg/lb ai) * dermal absorption (0.06) * application rate (lb ai/acre) * daily acres treated / body weight (60 kg).

f Daily inhalation dose (mg/kg/d) = (unit exposure (µg/lb ai) * (1mg/1000 µg) conversion * application rate (lb ai/acre) * daily acres treated / body weight (60 kg).

g Combined daily dose = daily dermal dose + daily inhalation dose.

h MOE = NOAEL (10 mg/kg/d) / combined daily dose. UF = 100.

Table 4. Intermediate-Term Non-Cancer Risk for Occupational Handlers.

Exposure Scenario (Scenario #)	Mitigation Level ^a	Dermal Unit Exposure ^b (mg/lb ai)	Inhalation Unit Exposure ^c (µg/lb ai)	Crop	Application Rate (lb ai/A)	Amount Treated ^d (A/day)	Daily Dermal Dose ^e (mg/kg/day)	Daily Inhalation Dose ^f (mg/kg/day)	Combined Daily Dose ^g (mg/kg/day)	MOE ^h
Mixer/Loader										
Wettable Powder (WSP) for Ground-boom for ground-boom (1)---a	Single layer no gloves	0.021 (PHED)	0.24 (PHED)	Turf	1.5	80	0.00216	0.000411	0.002571	580
Wettable Powder (WSP) for Ground-boom for ground-boom (1)---b	long pants short sleeve	0.0227 (Day 1987)	0.726 (Day 1987)	Turf	1.5	80	0.00234	0.001245	0.003585	420
Liquid for Ground-boom (2)	Single layer no gloves	2.9 (PHED)	1.2 (PHED)	Turf	0.26	80	0.0517	0.000357	0.052057	29
Liquid for Ground-boom (2)	Single layer +gloves	0.023 (PHED)	1.2 (PHED)	Turf	0.26	80	0.000407	0.000357	0.000764	2,000
Granules for Tractor-Drawn Spreader (3)	Single layer no gloves	0.0084 (PHED)	1.7 (PHED)	Turf	1.5	80	0.000864	0.002914	0.003778	400
Applicator										
Sprays with Ground-boom (4)---a	Single layer no gloves	0.014 (PHED)	0.74 (PHED)	Turf	1.5	80	0.00144	0.001269	0.002709	550
Sprays with Ground-boom (4)---a	Single layer no gloves	0.014 (PHED)	0.74 (PHED)	Turf	0.26	80	0.000248	0.000218	0.000466	3,200
Sprays with Ground-boom (4)---b	long pants short sleeve	0.0639 (Day 1987)	0.455 (Day 1987)	Turf	1.5	80	0.00657	0.00078	0.00735	200
Sprays with Ground-boom (4)---b	long pants short sleeve	0.0639 (Day 1987)	0.455 (Day 1987)	Turf	0.26	80	0.00113	0.000134	0.001264	1,200
Granules with Tractor-Drawn Spreader (5)	Single layer no gloves	0.0099 (PHED)	1.2 (PHED)	Turf	1.5	80	0.001018	0.002057	0.003075	500
Mixer/Loader/Applicator										
Wettable Powder (WSP) with Handgun (6)	Single layer +gloves	0.64 (ORETF)	7.2 (ORETF)	Turf	1.5	5	0.00411	0.00077	0.00488	310
Liquid with Handgun (7)	Single layer +gloves	0.45 (ORETF)	1.8 (ORETF)	Turf	0.26	5	0.00050	0.000033	0.000533	2,800
Granules with Push-Type Spreader (8)	long pants short sleeve	0.35 (ORETF)	7.3 (ORETF)	Turf	1.5	5	0.00225	0.00078	0.003032	490
Granules with Belly-Grinder (9)	Single layer no gloves	10 (PHED)	62 (PHED)	Turf	1.5	1	0.012855	0.001329	0.014184	110

^a Baseline consists of long-sleeve shirt, long pants, shoes, and socks and no respirator. PPE consists of long-sleeve shirt, long pants, shoes, socks, chemical-resistant gloves, and no respirator.

- b Baseline Dermal Unit Exposure represents long pants, long sleeved shirt, no gloves, open mixing/loading, and open cab tractors, as appropriate.
- c Baseline Inhalation Exposure represents no respiratory protection, open mixing/loading, and open cab tractors, as appropriate.
- d Daily acres treated values are from EPA estimates of acreage that could be treated or volume handled in a single day for each exposure scenario of concern, based on the application method and formulation/packaging type.
- e $\text{Daily dermal dose (mg/kg/d)} = [\text{unit dermal exposure (mg/lb ai)} * \text{dermal absorption (0.06)} * \text{application rate (lb ai/acre)} * \text{daily acres treated} / \text{body weight (70 kg)}]$.
- f $\text{Daily inhalation dose (mg/kg/d)} = (\text{unit exposure (}\mu\text{g/lb ai)} * (\text{1 mg/1000 } \mu\text{g)} \text{ conversion} * \text{application rate (lb ai/acre)} * \text{daily acres treated} / \text{body weight (70 kg)}]$.
- g Combined daily dose = daily dermal dose + daily inhalation dose.
- h $\text{MOE} = \text{NOAEL (1.5 mg/kg/d)} / \text{combined daily dose. UF} = 100$



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C., 20460

OFFICE OF
CHEMICAL SAFETY AND
POLLUTION PREVENTION

PC Code: 125701
DP Barcode: D374783, D374788, D374790
D374791, D374792, D374796
Date: June 9, 2010

MEMORANDUM

SUBJECT: Revised Section 3 Environmental Fate and Ecological Risk Assessment of Flurprimidol Proposed for New Uses on Turf grasses and Ornamentals.

TO: Tony Kish, Product Manager
Bryant Crowe, Risk Manager Reviewer
Registration Division (7505P)

FROM: Stephen Carey, Biologist
James K. Wolf, Ph.D., Environmental Scientist
Environmental Risk Branch III

THROUGH: James A. Hetrick, Ph.D., Senior Scientist
Pamela Hurley, Ph.D., Senior Scientist
Dana Spatz, Branch Chief
Environmental Risk Branch III
Environmental Fate and Effects Division (7507P)

This Section 3 ecological risk assessment was conducted for the proposed labeled uses for outdoor and residential use in right-of-ways, industrial, golf resorts, and athletic fields, commercial, municipal and residential turf using the active ingredient, flurprimidol, as a plant growth regulator to control growth of turf grasses, ornamentals, and a variety of bedding, flowering, bulb crop, perennial, and woody landscape plants.

This risk assessment was revised to update the terrestrial exposure analysis for banded application to ground surfaces. In the previous assessment, the inputs for banded applications modeled in T-REX reflected agricultural practices where a band application is made between rows of an acre field rather than around the perimeter of an area or building; thus, the revised RQs for "banded" applications occurring on the edge of a site are adjusted using broadcast applications with the understanding that the entire acre will not be completely treated when "banded" applications are applied as little as six inches wide on the edge/perimeter of an area.

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I. Executive Summary

A. Nature of the Chemical Stressor

Flurprimidol (RS)-2-methyl-1-pyrimidin-5-yl-1-(4-trifluoromethoxyphenyl)propan-1-ol, a plant growth regulator, was developed to reduce internode elongation of plants through the inhibition of gibberellin biosynthesis. Reduced plant growth improves the management and quality of perennial cool and warm seasons turf grasses on golf courses, athletic fields, commercial, municipal, and residential turf and perennial landscape and container grown ornamental plants.

There are five active products for flurprimidol considered in this assessment: Reg. No. 67690-15, Cutless 50W Turf Growth Regulator; Reg. No. 67690-46, SP5075 Turf Growth Regulator; Reg. No. 67690-19, Turf Fertilizer – Contains Cutless 0.5%; Reg. No. 67690-44, Turf Fertilizer – Contains Cutless 0.17% and Reg. No. 67690-13, Cutless 0.33G Landscape Growth Regulator. These products are labeled for terrestrial outdoor and residential sites as a non-crop use. The products are applied via ground boom-type and backpacker sprayers, and granular spreaders.

B. Potential Risk to Non-target Organisms

Based on all available data, including the submission of new studies, potential chronic risk from the proposed new uses of flurprimidol on turf grasses and ornamentals is expected for birds and mammals. Acute risks to mammals are presumed. The potential for risks to aquatic non-vascular plants is minimal; however, risks to aquatic vascular and terrestrial plants are expected since flurprimidol is a plant growth regulator. Minimal acute and chronic risks to aquatic organisms and minimal acute risk to birds are presumed.

Table I-1 presents the Risk Quotients (RQs) and use patterns used to determine the potential risks to terrestrial and aquatic organisms and plants exposed to flurprimidol.

Table I-1. Summary of Risk Quotient Calculation for Flurprimidol Exposures to Terrestrial and Aquatic Organisms and Plants.*

Flurprimidol RQs and Use Patterns				
Species	Broadcast Spray	Banded Spray	Broadcast Granular	Banded Granular
Aquatic Organisms and Plants				
Fish	All Acute RQs: <0.01 Chronic RQs: <0.1 – 0.13			
Invertebrates	All Acute RQs: <0.01 All Chronic RQs: <0.1			
Aquatic Non-Vascular Plants	All Non-Listed Plant RQs: 0.14 – 0.16 All Listed Plant RQs: 0.42 – 0.49			
Aquatic Vascular Plants	Non-Listed Plant RQs: 0.18 – 0.48 Listed Plant RQs: 1.76 – 4.59		Non-Listed Plant RQs: 0.34 – 0.88 Listed Plant RQs: 4.65 – 8.42	
Terrestrial Animals and Plants				
Birds	Acute RQs: NC Chronic RQs: <0.1–1.6	Acute RQs: NC	Acute RQs: NC Chronic RQs: <0.1	Acute RQs: NC
Mammals	Acute RQs: <0.1–0.3 Chronic RQs: <0.1–30	Acute RQs: 0.01 – 0.31	Acute RQs: 0.06 – 1.3 Chronic RQs: <0.1	Acute RQs: 0.03 – 0.67
Terrestrial Monocots	Non-Listed Plant RQs: <0.1 – 2.7 Listed Plant RQs: <0.1 – 10		Non-Listed Plant RQs: <0.1 – 11 Listed Plant RQs: <0.1 – 40	
Terrestrial Dicots	Non-Listed Plant RQs: 0.24 – 32 Listed Plant RQs: <0.1 – 125		Non-Listed Plant RQs: 0.57 – 87 Listed Plant RQs: <0.1 – 341	

* Bold entries indicate LOC exceedance

NC – RQs not calculated since toxicity was greater than the highest doses tested; potential risk is presumed minimal

C. Conclusions – Exposure Characterization

Based on all acceptable and supplemental data, the major routes of dissipation for flurprimidol are expected to be leaching and runoff, plant uptake because the compound is a systemic plant growth regulator, and photolysis in aqueous systems. Flurprimidol is stable to hydrolysis and resistant to degradation in both aerobic and anaerobic terrestrial environments and is assumed to be similarly persistent in both aerobic and anaerobic aquatic environments. Flurprimidol is highly mobile in soil, is of moderate solubility in sterile water, has a low potential for bioaccumulation based on its bioconcentration factors (BCF) and rapid depuration, and is not expected to volatilize.

Given this profile, the main routes of exposure from use of flurprimidol are expected to be runoff and spray drift and direct ingestion of assessed feed items and granules. Given the low K_d of this plant growth regulator, transport with and accumulation in sediment are not expected to be significant routes of exposure. Typically, EFED evaluates the potential for aquatic exposure to pesticides through an assessment of available surface water and groundwater monitoring data and modeling. For flurprimidol, no monitoring data were available for use in this assessment; therefore, potential exposure to flurprimidol in water was evaluated through modeling. For this assessment, EFED relied on Tier I and II modeling using GENEEC2 and PRZM/EXAMS, respectively, for aquatic exposure concentrations (**Appendices A and B**). Terrestrial residues

were predicted using T-REX version 1.3.1 (**Appendix C**) and earthworm fugacity model (**Appendix D**). TerrPLANT version 1.2.2 (**Appendix E**) was modeled for terrestrial plants.

D. Conclusions – Ecological Effects Characterization

Laboratory toxicity data suggest that flurprimidol is slightly toxic on an acute basis to freshwater animals, with fish and invertebrate LC50s ranging from 12-18 mg a.i./L. There are no acute toxicity data available to characterize acute effects to their estuarine/marine counterparts; however, based on data for freshwater animals, flurprimidol is assumed to be, at most, slightly toxic to estuarine/marine organisms. Chronic toxicity data indicate reductions in fry survival, length, and weight of freshwater fish and reductions in days of first brood, young per adult, and adult length of invertebrates, with fish and invertebrate NOAECs ranging from 0.939 to 2.95 mg a.i./L. Toxicity data for aquatic vascular and non-vascular plants identified EC50s of less than 1 mg a.i./L.

Acute oral and subacute dietary toxicity tests suggest that flurprimidol is practically nontoxic to birds. Flurprimidol is slightly toxic to mammals on an acute oral basis, with an LD50 of 709 mg a.i./kg-bw. Chronic toxicity data with birds indicate reductions in egg production, embryo survival, and hatchability as low as 309 mg a.i./kg-diet. A two-generation chronic mammalian (rat) toxicity study demonstrated decreased mating, fertility, and fetal survival (stillbirths) in both generations at flurprimidol levels of 1000 mg a.i./kg-diet (equivalent to 74 mg a.i./kg-bw/day) and a reproductive NOAEL of 100 mg a.i./kg-diet (equivalent to 7.3 mg a.i./kg-bw/day).

E. Listed Species

The listed species exposed through direct effects or indirect effects resulting from the proposed use of flurprimidol where turf grass and ornamentals are grown and conclusions are presented in **Table I-2**. As a result, this ecological risk assessment for use of flurprimidol on turf grasses and ornamentals indicates direct effects LOC exceedances for birds, terrestrial-phase amphibians, reptiles, mammals, and terrestrial and aquatic vascular plants. Therefore, there is a potential for indirect effects to listed animal and plant taxa that depend on those taxa directly at risk when exposed to flurprimidol as pollinators or seed dispersers, mammal or reptile burrows for habitat, feeding, or cover requirements, and for survival, growth, or reproduction.

Table I-2. Potential Listed Species Risks Associated with Direct or Indirect Effects Due to Outdoor and Residential Uses with Flurprimidol			
Listed Taxon	Direct Effects from Acute Exposures	Direct Effects from Chronic Exposures	Indirect Effects
Aquatic			
Aquatic non-vascular plants	No	N/A	Yes
Aquatic vascular plants	Yes	N/A	Yes
Freshwater invertebrates	No	No	Yes
Marine/estuarine invertebrates	No	No	No
Freshwater fish	No	No	Yes
Marine/estuarine fish	No	No	No
Aquatic-phase amphibians	No	No	Yes
Terrestrial			
Semi-aquatic plants – monocots	Yes	N/A	Yes
Semi-aquatic plants – dicots	Yes	N/A	Yes
Terrestrial plants – monocots	Yes	N/A	Yes
Terrestrial plants – dicots	Yes	N/A	Yes
Insects	No	N/A	Yes
Birds	No	Yes	Yes
Terrestrial-phase amphibians	No	Yes	Yes
Reptiles	No	Yes	Yes
Mammals	Yes	Yes	Yes

N/A - indicates that this exposure route is not assessed.

II. Problem Formulation

The purpose of this problem formulation is to provide the foundation for the ecological risk assessment being conducted for the proposed use of flurprimidol as a plant growth regulator on turf grasses and ornamentals. The problem formulation for flurprimidol articulates the purpose and objectives of the risk assessment, evaluates the nature of the problem, and provides a plan for analyzing the data and characterizing the risk (USEPA, 1998).

A. Stressor Source and Distribution

1. Nature of Stressor

This ecological risk assessment addresses the potential ecological risks associated with the proposed new uses of flurprimidol, a plant growth regulator, on turf grasses and ornamental plants grown nationwide. Given that turf grasses and ornamentals are grown across the country and there are currently no geographic restrictions on the proposed label, the potential market for this product is large. As a policy, when conducting an ecological risk assessment for new uses, EFED assumes that the stressor has the potential to be applied anywhere the turf grasses and ornamentals are grown and does not consider predicted sales, market trends, etc.

A summary of selected physical, chemical, and environmental fate properties of flurprimidol is presented in **Table II-1**. Overall, the dominant dissipation mechanism for flurprimidol is expected to be via leaching due to its mobile nature, plant uptake because the compound is a plant growth regulator that is taken up by the plant and by photolysis in aqueous systems. Flurprimidol is stable to hydrolysis and resistant to degradation in both aerobic and anaerobic terrestrial systems. Field dissipation data suggest that much more rapid dissipation was found that might be expected from the laboratory studies; however, the registrant postulates that this could be due to a number of factors not tracked in the study including plant uptake and volatilization. Consequently, given that when applied to bareground sites, flurprimidol was very persistent and because of the low volatility of this compound, it appears that plant uptake may be the dominant route of removal from the field.

The chemical structure of flurprimidol is shown in **Figure 1**.

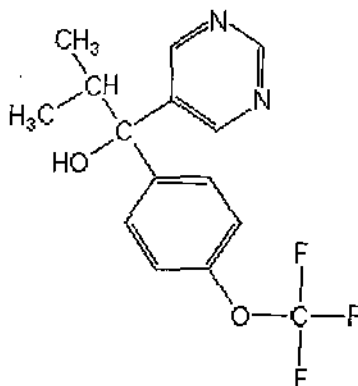


Figure 1. Flurprimidol Structure

Selected chemical and physical properties of flurprimidol are summarized below in **Table II-1**.

Table II-1. Summary of Chemical and Physical Properties of Flurprimidol

Common Name:	Flurprimidol
Empirical Formula:	C ₁₅ H ₁₅ F ₃ N ₂ O ₂ .
Chemical Name:	(RS)-2-methyl-1-pyrimidin-5-yl-1-(4-trifluoromethoxyphenyl)propan-1-ol
(IUPAC)	
(CAS)	α-(1-methylethyl)-α-[4-(trifluoromethoxy)phenyl]-5-pyrimidinemethanol
Chemical Abstracts #:	56425-91-3
PC Code	125701
Chemical Class:	Pyrimidinyl carbinol
Molecular Weight:	312.3 g/mol

Water Solubility (20° C):	130 mg/L
Vapor Pressure (25° C):	3.64×10^{-7} mmHg
Octanol/water Partition Coefficient: (K_{ow})	933

Environmental Fate Properties

Hydrolysis $T_{1/2}$:	Stable at pHs 5, 7, and 9
Aqueous Photolysis $T_{1/2}$:	1.4 days
Soil Photolysis $T_{1/2}$:	No data
Aerobic Soil Metabolism $T_{1/2}$:	482 days
Aerobic Aquatic Metabolism $T_{1/2}$:	No data
Soil Sorption Coefficient K_{oc} :	268 to 535 mL/goc
K_d :	0.12 to 4.9 mL/g

It should be noted that the carbon in the 1-position in the propane moiety (the carbinol C) is a chiral molecule. However, EFED has no records of the discussion of the stereo chemistry of the molecule or possible differences in environmental fate properties or ecotoxicity between isomers. Based upon the Confidential Statement of the Formula's silence on the chirality questions, EFED is assuming the technical flurprimidol is a racemic mixture, with two isomers being of equal activity

2. Mode of Action

Flurprimidol is a turf growth regulator, which reduces leaf blade length and stem internode elongation in turf grass. It also is a systemic landscape growth regulator which suppresses terminal growth in established woody ornamental and perennial ground covers. Growth regulation results from suppression of gibberellic acid biosynthesis.

3. Overview of Pesticide Usage

Flurprimidol is a plant growth regulator for use on turf grass in golf courses; on a variety of bedding, flowering, perennial, and woody landscape plants in nurseries, greenhouses, and shadehouses; and on trees and plants in forest, industrial, and rights-of-way areas. Uses include golf course turf, forest trees, ornamentals, and a variety of bedding, flowering, bulb crop, perennial, and woody landscape plants. The proposed product labels are adding athletic fields, commercial, municipal and residential turf to the current registration, including edging/banding applications for landscape beds, sidewalks, perimeter of lawns, curbs, parking lots, driveways, posts, mailboxes, building structures, gravestones, fences, and other similar areas.

Application information for current registered uses and proposed new uses for flurprimidol is summarized in **Table II-2**. Flurprimidol is formulated as a wettable powder (10% - 50% active ingredient), soluble/solid concentrate (99.3% a.i.), liquid (0.38% - 13.26% a.i.), liquid - ready to use (48.1% a.i.), granule (0.17% - 0.5% a.i.), and as well as impregnated (93.6% a.i.) on

granular fertilizer producing granular formulation products. Application equipment includes spreader, backpack sprayer, low-pressure hand wand, ground boom sprayer, injection equipment, by hand, drencher, drip irrigation, tank-type sprayer or sprinkler irrigation. Application is via foliar treatment, spot treatment, chemigation, tree injection or implant treatment, drench, edging treatment, or band treatment. Single application rates for treatment range from 0.26 to 3.0 pounds active ingredient/acre (lbs a.i./A) and seasonal application rates are up to 3.008 lbs a.i./A. Chemigation is not allowed in the States of New York and California.

The current registered uses and proposed new uses for flurprimidol are presented in **Table II-2**.

Table II-2. Current Registered Use and Proposed New Use Patterns for Flurprimidol						
Uses	Product	Application Method	Maximum Single rate (lb ai/A)	Maximum yearly rate (lb ai/A)	Minimum # of Intervals	# of Applications per Season
Proposed New Uses						
Turfgrasses	SP5075 Turf Grow Regulator ^{1,7}	Broadcast (Spray)	0.26	3.0	2 weeks	11
		Edge/Band (Spray)	0.69	3.0	8 weeks	4
Turfgrasses and Ornamentals	Turf Fertilizer Cutless ^{2,7}	Broadcast (Granular)	0.75	3.0	3 weeks	4
		Ornamentals (Granular)	1.0	3.0	2 months	3
		Spot Treatment (Granular)	3.0	3.0	3 weeks	1
Turfgrasses	Cutless 50W Turf Plant Regulator ^{3,7}	Turf Grass (Spray)	0.75	3.0	2 weeks	4
		Edge/Band (Spray)	1.5	3.0	8 weeks	2
Turfgrasses and Ornamentals	Cutless 0.33G Plant Growth Regulator ^{4,7}	Broadcast (Granular)	0.75	3.0	3 weeks	4
		Broadcast (Granular)	1.0	3.0	3 weeks	3
		Edge/Band (Granular)	1.5	3.0	8 weeks	2
		Ornamentals (Granular)	1.5	3.0	2 months	2
Turfgrasses	Turf Fertilizer Cutless ^{5,7}	Broadcast (Granular)	1.0	3.0	3 weeks	3
		Edge/Band (Granular)	1.5	3.0	8 weeks	2
		Ornamentals (Granular)	1.5	3.0	8 weeks	2
Current Registered Uses						
Woody Ornamentals	TopFlor Ornamental Plant Growth	Drench, Chemigation, and Spray	0.3626	1.08	5 days	3

Bulb Crops, Bedding Plants, Flowering & Foliage Potted Plants, and Bedding Plant Plugs			0.145	0.435	5 days	3
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¹ 67690-46 SP5075, Turf Grow Regulator/EC (13.26 % ai); density = 1.10 lb ai/gallon; 0.00859 lb ai/fl. oz.

² 67690-19, Turf Fertilizer Cutless 0.5%/G (0.5 % ai); density = 0.005 lb ai/lb of product

³ 67690-15, Cutless 50W Turf Plant Regulator (50 % ai); density = 0.5 lb ai/lb of product

⁴ 67690-13, Cutless 0.33G Plant Growth Reg/G (0.33 % ai); density = 0.0033 lb ai/lb of product

⁵ 67690-44, Turf Fertilizer Cutless/G (0.17 % ai); density = 0.017 lb ai/lb of product

⁶ 67690-20, Topflor Ornamental Plant Growth Regulator (0.38 % ai); density = 15 g ai/gallon of product

⁷ 67690-16 Cutless Technical

B. Receptors

Assessment endpoints are explicit expressions of the actual environmental value that is to be protected. Assessment endpoint selection is based on valued entities or ecological receptors; the ecosystems potentially at risk, pesticide migration pathways, and routes by which ecological receptors may be exposed to the stressor. Endpoints for baseline ecological risk assessments typically include survivorship and sublethal parameters for aquatic and terrestrial species that may be exposed to a given stressor. Although assessment endpoints typically focus on individual toxicity of surrogate species, depending on the magnitude of an effect it may be possible to make risk predictions regarding indirect effects on species in higher or lower trophic levels.

1. Aquatic Effects

The toxicity of flurprimidol to aquatic organisms and plants is assessed using acute and chronic laboratory studies submitted by the registrant to the Agency. With the recent submission of aquatic toxicity data with duckweed, fish early-life-stage study with fathead minnow, and life-cycle study with daphnids, the aquatic toxicity profile is updated (**Table IV-1**). In addition, freshwater fish acts as a surrogate for aquatic-phase amphibian when data are not available on amphibians.

2. Terrestrial Effects

The effect of flurprimidol to terrestrial organisms and plants is assessed from acute, subacute and chronic studies submitted by the registrant to the Agency. With the recent submission of terrestrial toxicity data on avian reproduction, seedling emergence, and vegetative vigor, the terrestrial toxicity profile is updated (**Table IV-2**). Also, birds act as surrogates for reptiles and terrestrial-phase amphibians when data on those species are not available.

3. Ecosystem at Risk

The terrestrial ecosystem typically at risk includes the treated area and areas adjacent to treated area that might receive spray drift, runoff, or wind-erosion of soil particles. Aquatic ecosystems

typically at risk include water bodies receiving runoff and/or drift from treated sites. Because flurprimidol has the potential to be used anywhere there are turfgrass and ornamentals, the ecosystems potentially at risk are national in scope.

C. Assessment Endpoints

Assessment endpoints are defined as "explicit expressions of the actual environmental value that is to be protected." Defining an assessment endpoint involves two steps: 1) identifying the valued attributes of the environment that are considered to be at risk; and 2) operationally defining the assessment endpoint in terms of an ecological entity (i.e., a community of fish and aquatic invertebrates) and its attributes (i.e., survival and reproduction). Therefore, selection of the assessment endpoints is based on valued entities (i.e., ecological receptors), the migration pathways of pesticides, and the routes by which ecological receptors are exposed to pesticide-related contamination. The selection of clearly defined assessment endpoints is important because they provide direction and boundaries in the risk assessment for addressing risk management issues of concern.

A summary of the assessment and measurement endpoints selected to characterize potential ecological risks associated with exposure to flurprimidol are summarized in **Table II-3**. The ecological relevance of selecting these assessment endpoints is as follows: 1) complete exposure pathways exist for these receptors, 2) the receptors may be potentially sensitive to pesticides in affected media and in residues on plants, seeds, and insects, and 3) the receptors could potentially inhabit areas where pesticides are applied or areas where runoff and/or drift may impact the sites.

This ecological risk assessment considers maximum application rates on vulnerable soils, maximum number of applications (as well as single applications), and minimum intervals between applications for representative uses to estimate exposure concentrations. Exposure scenarios are developed to evaluate potential risks to non-target wildlife and plant from flurprimidol treatments on turfgrasses and ornamentals. Six exposure scenarios were estimated for the proposed new uses of flurprimidol: four broadcast spray application at 0.75 lb a.i./A with a 2 week reapplication interval, twelve applications at 0.26 lb a.i./A with a 2 week intervals, five banded (6 inch bandwidth) spray application at 0.69 lb a.i./A, four broadcast application of granules at 0.75 lb a.i./A, one broadcast application of granules at 3.0 lb a.i./A, and two banded (6 inches) application of granules at 1.5 lb a.i./A.

This assessment is not intended to represent a site or time-specific analysis. Instead, this assessment is intended to represent high-end exposures at a national level. Likewise, the most sensitive toxicity endpoints are used from surrogate test species to estimate treatment-related direct effects on acute mortality and chronic reproductive, growth and survival assessment endpoints. Toxicity tests are intended to determine effects of pesticide exposure on birds, mammals, fish, terrestrial and aquatic invertebrates, and plants. These tests include short-term acute, subacute, and reproduction studies and are typically arranged in a hierarchical or tiered system that progresses from basic laboratory tests to applied field studies. The toxicity studies are used to evaluate the potential of a pesticide to cause adverse effects, to determine whether further testing is required, and to determine the need for precautionary label statements to

minimize the potential adverse effects to non-target animals and plants (40 CFR §158.202, 2002).

In order to protect threatened and endangered species, all assessment endpoints are measured at the individual level. Measuring endpoints at the individual level also provides insight about risks at higher levels of biological organization (e.g. population and communities). For example, pesticide effects on individual survivorship have important implications for both population growth increase and habitat carrying capacity.

Table II-3. Summary of Assessment Endpoints and Measures of Ecological Effects*			
Assessment Endpoint		Surrogate Species and Measures of Ecological Effect¹	Measures of Exposure
Birds ²	Survival	-Bobwhite quail acute oral LD ₅₀ -Bobwhite quail and mallard duck subacute dietary LC ₅₀	<ul style="list-style-type: none"> • Maximum residues on food items (foliar) • LD₅₀/sqft (granular ingestion)
	Reproduction and growth	Bobwhite quail and mallard duck reproduction NOAEC	
Mammals	Reproduction and growth	Laboratory rat reproduction NOAEC and NOAEL	
	Survival	Laboratory rat acute oral LD ₅₀	
Freshwater fish ³	Survival	Rainbow trout and bluegill sunfish acute LC ₅₀	Peak EEC ⁴
	Reproduction and growth	Freshwater fish reproduction NOAEC	60-day average EEC ⁴
Freshwater invertebrates	Survival	Water flea acute EC ₅₀	Peak EEC ⁴
	Reproduction and growth	Water flea reproduction NOAEC	21-day average EEC ⁴
Estuarine/marine fish	Survival	Sheepshead minnow acute LC ₅₀ (study not required at this time)	Peak EEC ⁴
Estuarine/marine invertebrates	Survival	Eastern oyster acute EC ₅₀ and mysid acute LC ₅₀ (study not required at this time)	Peak EEC ⁴
Terrestrial plants ⁵	Survival and growth	Monocot and dicot seedling emergence and vegetative vigor EC ₂₅ and NOAEC values	Estimates of runoff and spray drift to non-target areas
Insects	Survival (not quantitatively assessed)	Honeybee acute contact LD ₅₀	Maximum application rate
Soil-dwelling invertebrates	Survival	Earthworm acute LC ₅₀	Soil EEC
Aquatic plants and algae	Survival and growth	Algal (green algae) and vascular plant (duckweed) EC ₅₀ and NOAEC values for growth rate and biomass measurements	Peak EEC ⁴

Table II-3. Summary of Assessment Endpoints and Measures of Ecological Effects*		
Assessment Endpoint	Surrogate Species and Measures of Ecological Effect ¹	Measures of Exposure

¹ If species listed in this table represent most commonly encountered species from submitted studies, risk assessment guidance indicates most sensitive species tested within taxonomic group are to be used for baseline risk assessments.

² Birds represent surrogates for amphibians (terrestrial phase) and reptiles.

³ Freshwater fish may be surrogates for amphibians (aquatic phase).

⁴ Based on GENECC2 and PRZM/EXAMS estimates of aquatic EECs.

⁵ Four species of two families of monocots - one is corn, six species of at least four dicot families, of which one is soybeans.

* LD₅₀ = Lethal dose to 50% of the test population; NOAEC = No observed adverse effect concentration; LOAEC = Lowest observed adverse effect concentration; LC₅₀ = Lethal concentration to 50% of the test population; EC₅₀/EC₂₅ = Effect concentration to 50%/25% of the test population.

D. Conceptual Model

1. Risk Hypotheses

Risk hypotheses are specific assumptions about potential adverse effects (i.e., changes in assessment endpoints) and may be based on theory and logic, empirical data, mathematical models, or probability models (USEPA, 1998). For this assessment, the risk is stressor-linked, where the stressor is the release of flurprimidol to the environment. The following risk hypothesis is presumed for this baseline assessment.

The use of flurprimidol as a plant growth regulator for terrestrial and residential outdoor uses will result in exposure to terrestrial and aquatic animals and plants. Based on the persistence and mobility of flurprimidol, the mode of action, the application methods, and food-web of the target terrestrial ecosystems, flurprimidol has the potential to cause reduced survival, and reproductive and growth impairments for both terrestrial and aquatic animals and plant species.

2. Conceptual Model Diagram

The conceptual model is used to depict the potential routes of exposure from flurprimidol when used as a plant growth regulator on turfgrasses and ornamentals in terrestrial and residential outdoor settings. All potential routes of exposure are considered and presented in the conceptual model (**Figures 2 and 3 for terrestrial and aquatic ecosystems, respectively**). The conceptual model generically depicts the potential source of flurprimidol, release mechanisms, abiotic receiving media, biological receptor types, and effects endpoints of potential concern.

In order for a chemical to pose an ecological risk, it must reach ecological receptors in biologically significant concentrations. An exposure pathway is the means by which a contaminant moves in the environment from a source to an ecological receptor. For an ecological exposure pathway to be complete, it must have a source, an environmental transport medium, a point of exposure for ecological receptors, and a feasible route of exposure. The assessment of ecological exposure pathways, therefore, includes an examination of the source and potential migration pathways for constituents, and the determination of potential exposure routes (e.g., ingestion, inhalation, dermal contact).

Potential exposure pathways by which flurprimidol may inadvertently affect non-target plant and animal populations in aquatic areas are drift (from spray application) and runoff/leaching of contaminated water from treated areas to untreated areas. In terrestrial areas, the exposure routes are drift (from spray application), runoff events (off-site movement of contaminated water), leaching, wind erosion of contaminated soil particles, and direct ingestion of granules, aquatic animals, and earthworms. There may be exposure to non-target terrestrial plants adjacent to treated areas via drift and runoff from transitional sites or wetlands that may be dry during certain periods, or via wind-blown treated soil particles from those pathways for aquatic species. Exposure through aquatic media will mainly be to the parent compound since flurprimidol is persistent in the environment.

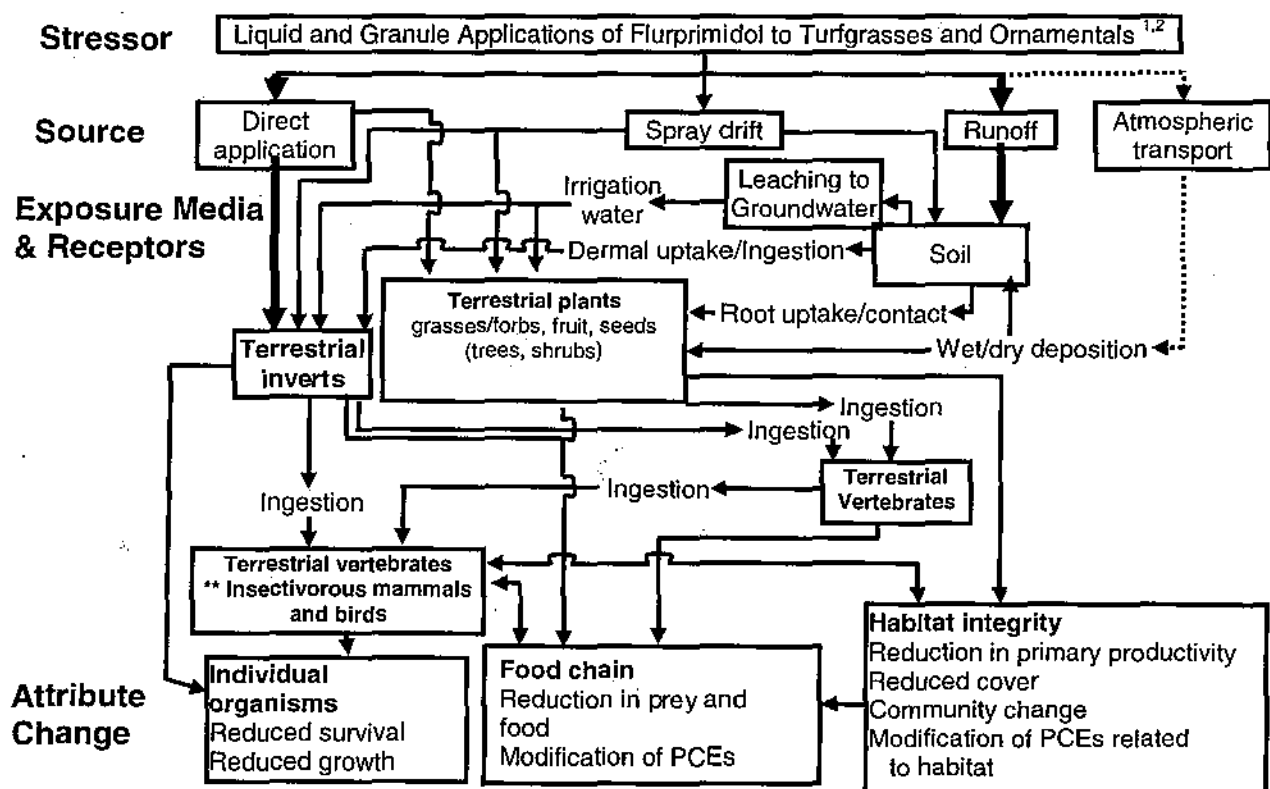


Figure 2. Terrestrial Environmental Risk Conceptual Model

** Route of exposure includes only ingestion of terrestrial invertebrates

1 - Dashed line represents unlikely exposure pathways; bold line represents likely exposure pathways

2 - Spray drift and atmospheric transport is not a concern for granule applications

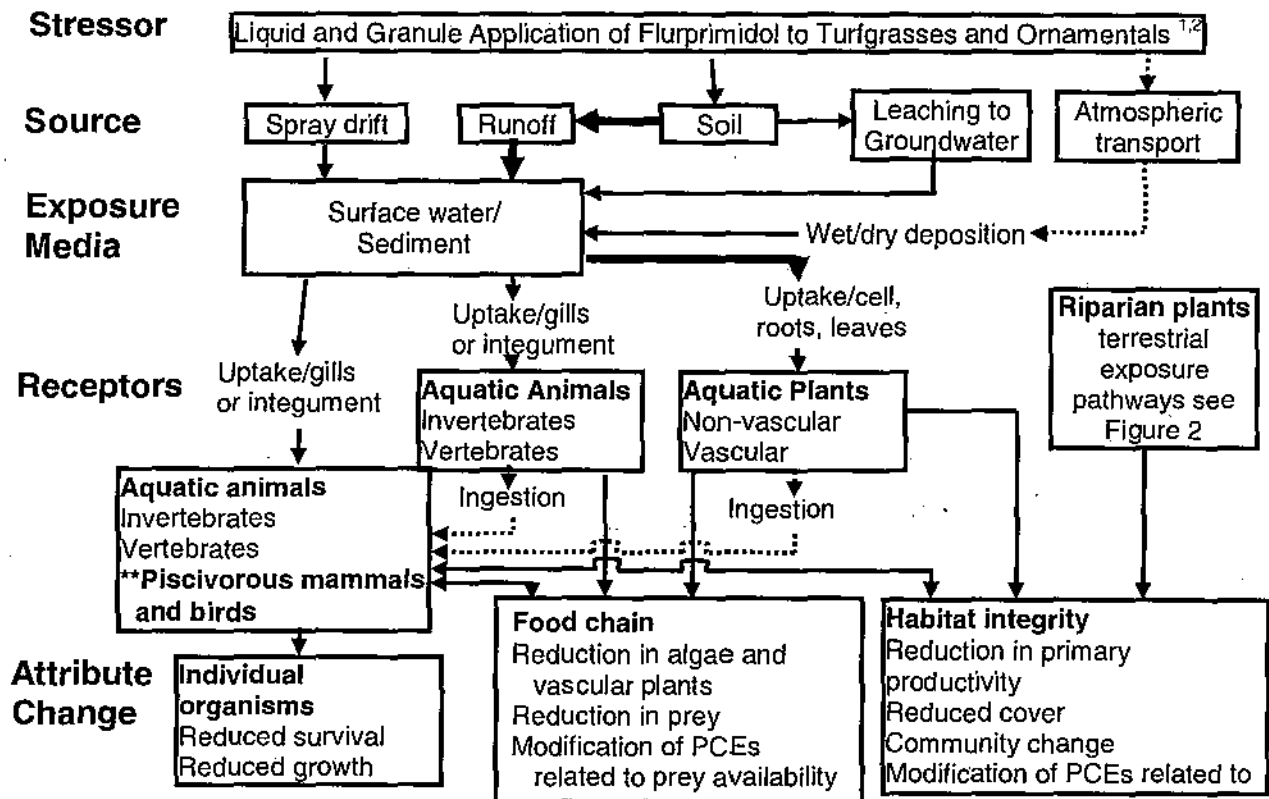


Figure 3. Aquatic Environmental Risk Assessment

** Route of exposure includes only ingestion of fish and aquatic invertebrates

1- Dashed line represents unlikely exposure pathways; bolded line represents likely exposure pathways

2 - Spray drift and atmospheric transport is not a concern for granule applications

E. Analysis Plan

In order to address the risk hypothesis, the potential for adverse effects on non-target aquatic and terrestrial animals and plants is estimated. In the following sections, the use, environmental fate, and ecological effects of flurprimidol are characterized and integrated to assess the risks. This is accomplished using risk indices (ratio of exposure concentration to effects concentration) approach. Although risk is often defined as the likelihood and magnitude of adverse ecological effects, the risk quotient- and LD₅₀ per square foot-based approaches do not provide a quantitative estimate of likelihood and/or magnitude of an adverse effect. Such estimates may be possible through a more refined, probabilistic assessment; however, they are beyond the scope of this baseline assessment. This analysis provides the basis for estimating and describing risks, identifying uncertainties in the risk hypothesis, and recommendations for new data collection if needed to fill the data gaps.

This assessment only considers the potential effects of the exposure as a result of the currently proposed uses. The Agency does not routinely include an evaluation of mixtures of active ingredients, either those mixtures of multiple active ingredients in product formulations or those in the applicator's tank. In the case of the product formulations of active ingredients (that is, a

registered product containing more than one active ingredient), each active ingredient is subject to an individual risk assessment for regulatory decision regarding the active ingredient on a particular use site. If effects data are available for a formulated product containing the active ingredient, they may be used qualitatively or quantitatively in accordance with the Agency's Overview Document and the Services' Evaluation Memorandum (USEPA 2004; USFWS/NMFS 2004).

For this baseline ecological risk assessment, estimated environmental concentrations (EECs) for aquatic and terrestrial systems were calculated using exposure scenarios for turfgrasses and ornamental use according to label information. EECs were calculated using T-REX (version 1.4.1) and GENEEC2 (version 2.0) (USEPA, 2001) and linked PRZM (Suarez, 2006) and EXAMS (Burns, 2004) models. Baseline terrestrial and aquatic concentrations represent values for a representative use grown in a generic location which have been chosen to represent all uses. EECs, and the resulting risk quotients from the TerrPlant model (version 1.2.2) for terrestrial plants growing in dry and semi-aquatic environments, are generated by using the seedling emergence and vegetative vigor toxicity information at the maximum proposed application rate. In addition, because flurprimidol has a low potential to bioaccumulate as demonstrated by its relatively low K_{ow} and low BCF factors in bluegill sunfish, the KABAM model is excluded from the assessment since minimum exposure is expected for piscivorous birds and mammals from ingesting bioconcentrated aquatic organisms with flurprimidol residues.

Also, EFED has no standard methodology for assessing chronic risk to terrestrial animals from ingesting granules. In order to estimate chronic risks for terrestrial animals, the estimate of flurprimidol concentrations accumulated in the tissues of earthworms was used to assess the chronic exposure estimates for terrestrial animals. Then, the earthworm residues (mg/kg-soil) are compared to terrestrial animal NOAEC values (mg a.i./kg) to estimate the potential for chronic risk to birds or mammals associated with direct ingestion of earthworms. This analysis assumes that 100% of the diet that birds and mammals consume is comprised of terrestrial soil invertebrates. However, it is unclear whether other routes of granular flurprimidol exposure (i.e., direct consumption of granules, ingestion of granules that adhere to soil invertebrates, partitioning of dissolved flurprimidol to on-site sources of wildlife drinking water, dermal exposure of granules released to surrounding soil, and on-site puddles) or combined routes of exposure would result in chronic risk concerns for birds.

1. Identification of Data Gaps

The environmental fate and ecological toxicity databases for flurprimidol are essentially complete. With the recent submission of new studies, the available data are generally sufficient for risk assessment purposes of the parent compound.

There are no toxicity studies with estuarine/marine organisms available; however, it was agreed that the studies are not requested at this time by the Agency due to minimal risk to their freshwater counterparts. Also, there are no acute toxicity data for passerine birds; however, the Agency is not requiring the studies at this time because both acute oral studies with bobwhite quail and mallard duck did not observe any mortality or sublethal effects; thus, it is likely for passerine birds to have similar results with the quail and duck.

2. Measures of Exposure

Aquatic Animals and Plants

Tier I and Tier II models were used to estimate flurprimidol concentrations in aquatic environment.

The Tier I simulation model GENEEC2 (Version 2.0; USEPA, 2001) is used to generate estimated environmental concentrations (EECs) of the active ingredient that are not expected to be exceeded 90% of the time in surface water bodies adjacent to application sites. The predicted peak, 21-day, and 60-day concentrations are used to estimate acute and chronic risks to aquatic animals inhabiting shallow-water aquatic communities that receive runoff during rainfall events and/or drift of the active ingredient from adjacent use sites.

GENEEC2 assumes application of the active ingredient to a 10-hectare agricultural field, planted solely in a generic crop, that drains into an adjacent 1-hectare water body, 2 meters deep (20,000 m³ volume) with no outlet. This generic agricultural scenario is representative of flutriafol use on apples and soybeans, and is likely to result in conservative estimates of exposure. GENEEC2 considers adsorption of the active ingredient to soil or sediment, direct deposition of spray drift into the water body, and degradation of the pesticide in soil before runoff and within the water body. It is a single event model, meaning that it assumes one single large rainfall/runoff event from a standard size field to a standard size ecological pond.

The Tier II models were also used to predict aquatic EECs for aquatic plant exposure assessment. The Tier II models used are the Pesticide Root Zone Model (PRZM; Suarez, 2006) coupled with the Exposure Analysis Model System (EXAMS; Burns, 2004). These models are parameterized using relevant reviewed registrant-submitted environmental fate data.

PRZM (v3.12.2) and EXAMS (v2.98.4.6) are screening simulation models coupled with the input shell PE5.pl (Aug 2007) to generate daily exposures and 1-in-10 year EECs of flurprimidol that may occur in surface water bodies adjacent to application sites receiving flurprimidol through runoff and spray drift. PRZM simulates pesticide application, movement and transformation on an agricultural field and the resultant pesticide loadings to a receiving water body via runoff, erosion and spray drift. EXAMS simulates the fate of the pesticide and resulting concentrations in the water body. The standard scenario used for ecological pesticide assessments assumes application to a 10-hectare agricultural field that drains into an adjacent 1-hectare water body, 2-meters deep (20,000 m³ volume) with no outlet. PRZM/EXAMS was used to estimate screening-level exposure of aquatic organisms to flurprimidol. The measure of exposure for aquatic species is the 1-in-10 year return peak or rolling mean concentration. The 1-in-10 year peak is used for estimating acute exposures of direct effects to aquatic plants.

Terrestrial Animals and Plants

The potential exposure pathways for terrestrial plants and animals include deposition from spray applications, runoff/leaching from treated areas, spray drift, and wind erosion of soil particles

resulting in residues on non-target species as well as residues on food items and granules for non-target species. As part of the terrestrial assessment, EFED used the models T-REX (ver. 1.3.1.; USEPA, 2001), earthworm fugacity model, and TerrPlant (ver. 1.2.2; USEPA, 2006) to estimate exposure concentrations of flutriafol to non-target birds, mammals and plants.

T-REX assumes application of the active ingredient to a one-acre agricultural field that settles on food items of avian and mammalian species (short and tall grass, broadleaf forage, large and small insects, fruits, pods, and seeds) and granules with flurprimidol residues within the field. The earthworm fugacity model assumes concentrations of flurprimidol in earthworm tissues. TerrPlant assumes application of the active ingredient to a one-acre agricultural field that drifts and/or is subject to runoff off site to adjacent fields of non-target plants.

For soil-dwelling invertebrates, soil EECs are estimated by converting the application rate of lb/A to mg/kg soil, using a soil density of 1.3 g/cm³.

3. Measures of Effect

Measures of effect are obtained from a suite of registrant-submitted guideline studies which were conducted with a limited number of surrogate species (**Tables II-4 and II-3**). The test species are not intended to be representative of the most sensitive species but rather were selected based on their ability to thrive under laboratory conditions. Toxicity testing reported in this risk assessment utilizes surrogate species to represent all freshwater fish (2000+) and bird (680+) species in the U.S.

The acute measures of effect used in this baseline assessment are the median lethal dose (LD₅₀), median lethal concentration (LC₅₀) or the median effect concentration (EC₅₀). These are measures of acute toxicity which result in 50% of the respective effect in tested organisms. The endpoints for chronic measures of effect are the No Observed Adverse Effects Concentration (NOAEC) and the No Observed Adverse Effects Level (NOAEL). The measurement endpoints used for risk characterization were derived from studies which underwent review and were classified as “acceptable” (conducted under guideline conditions and considered to be scientifically sound) or “supplemental” (conditions deviated from guidelines but the results are scientifically sound).

4. Integration of Exposure and Effects

Available exposure and toxicity data are compared in order to evaluate the risks of adverse ecological effects on non-target species. For this baseline assessment, the risk indices (RQ and LD₅₀/ft²) are used to compare exposure and toxicity values. The risk indices involve dividing EECs by acute and chronic toxicity values. The resulting RQs and LD₅₀/ft²s are then compared to the Agency’s levels of concern (LOCs) (USEPA, 2004). These criteria are used to indicate if applications of flurprimidol, as directed on the label, have the potential to cause adverse effects to non-target organisms. Although risk is often defined as the likelihood and magnitude of adverse effects, the risk quotient-based approach does not provide a quantitative estimate of likelihood and/or magnitude of an adverse effect, but rather provides a “yes” or “no” answer depending upon whether or not LOCs are exceeded.

LOCs currently address the following risk presumption categories: (1) **acute risk** – when a risk index is greater than the LOC of 0.5 to animals, (2) **acute restricted use** – when a risk index is greater than the LOC of 0.2 and 0.1 for terrestrial and aquatic animals, respectively, (3) **acute endangered species** – when a risk index is greater than the LOC of 0.1 and 0.05 for terrestrial and aquatic animals, respectively, (4) **chronic risk** – when a risk index is greater than the LOC of 1.0 to animals, and (5) **non-listed and listed plant risk** - when a risk index is greater than the LOC of 1.0 to plants.

III. ANALYSIS

A. Use Characterization

This risk assessment focuses exclusively on the use patterns of flurprimidol as a plant growth regulator on turfgrasses and ornamentals. Use patterns tabulated in **Table III-1** below serve as the basis for selecting the appropriate application rates and methods used as part of the input parameters needed to obtain EECs with simulation models.

Formulation	Method of Application	Maximum Application Rate lb a.i./A	Maximum Number of Applications (Interval)	Maximum Seasonal Use Rate lb a.i./A
Broadcast Foliar Spray	Ground	0.26	12 applications (14-day interval)	3.08
Broadcast Foliar Spray	Ground	0.75	4 applications (14-day interval)	3.08
Banded Foliar Spray	Ground	0.69	5 applications (56-day interval)	3.08
Broadcast Granular	Ground	0.75	4 applications (21-day interval)	3.08
Banded Granular	Ground	1.5	2 applications (56-day interval)	3.08
Broadcast Granular	Ground	3.0	1 application	3.08

B. Exposure Characterization

1. Environmental Fate and Transport Characterization

Overall, the dominant dissipation mechanism for flurprimidol is expected to be via leaching due to its mobile nature, plant uptake because the compound is a plant growth regulator that is taken up by the plant, and by photolysis in aqueous systems. Flurprimidol is stable to hydrolysis and resistant to degradation in both aerobic and anaerobic terrestrial systems. Field dissipation data for cropped turf plots suggest that much more rapid dissipation was found that might be expected from the laboratory studies; however, the registrant postulates that this could be due to a number of factors not tracked in the study including plant uptake and volatilization. Field dissipation data on bareground sites yields much longer dissipation times comparable to laboratory estimates

which suggest that the presence of plant material is influencing the dissipation in the field. No data was available to suggest how available flurprimidol is in plant residues and how flurprimidol residues in this compartment might influence overall exposures. Finally, flurprimidol is not expected to be volatile, has a moderate solubility in water, and a low potential to bioaccumulate as demonstrated by its relatively low K_{ow} and low BCF factors in bluegill sunfish.

In an acceptable hydrolysis study (MRID 00117921), flurprimidol was studied in three solutions buffered at pH5, pH7, and pH9 at a test concentration of 1 ppm. The solutions were incubated in the dark at 25°C and sampled for 31 days. Flurprimidol was stable to hydrolysis under all three test conditions.

An initial aqueous photolysis study (MRIDs 00142917; 40401006) was submitted for flurprimidol. However, these studies were rejected due to concerns about the nature of the artificial light source, the inability to control volatilization, and poor recoveries. The registrant responded to these concerns (MRID 40858503) however, the additional data did not change the conclusions and the study was deemed unacceptable. In response, the registrant submitted a new aqueous photolysis study (MRID 00117922) which provided supplemental data. The study was classified as supplemental because a material balance was not provided, degradates were not identified, the artificial light source was not compared to natural light, and the test solutions were not buffered. However, the study did provide supplemental data which indicates that flurprimidol applied at 1 ppm to an unbuffered aqueous solution at pH of 7.1 degraded rapidly with a half life of 3 to 4 hours. Subsequently, the registrant submitted a new study (MRID 41228001) in which the aqueous photolysis half life of flurprimidol was found to be 1.4 days in a pH solution of 7 at 25°C and sampled for 5 days. Material balance ranged from 97% to 102% and there were six photodegradates detected. Two of the degradation products achieved totals of greater than 10% of the applied but were not identified.

In an acceptable aerobic soil metabolism study (MRID 00117918), flurprimidol was studied in sandy loam, silt loam, and clay loam incubated at 75% of 0.33 bar at 20-25°C and sampled for 26 weeks. Regression analysis suggests a half life of 68.8 weeks; however, this value is suspect because it is extrapolated beyond the end of the study. Analysis revealed that over 30 degradation products were formed but none of these by-products exceeded 2% of applied. At 26 weeks post treatment, degradates totaled 12.6-19.4% of applied radioactivity in soil, and 3.4-4.4% were unextractable.

In an anaerobic soil metabolism study (MRID 40858504), flurprimidol was found to be extremely stable under anaerobic soil conditions. Flurprimidol was studied at 3 ppm in sandy loam, silt loam, and clay loam soils that were incubated for 8 weeks under flooded anaerobic conditions in the dark following 4 weeks of aerobic conditioning. In the three soils, flurprimidol comprised 91% to 93% of the recovered radioactivity immediately prior to the establishment of anaerobic conditions. Flurprimidol also accounted for roughly 90% of the radioactivity present after 4 weeks and 8 weeks of anaerobic conditions and is therefore considered stable to anaerobic metabolism. Material balances ranged from 93% to 103% prior to establishing anaerobic conditions.

Transformation Products

Because of the resistance of flurprimidol to degradation by hydrolysis and soil metabolism, information on transformation products of flurprimidol is limited. In an aqueous photolysis study (MRID 41228001), flurprimidol degraded readily with a half-life of 1.4 days. Six photodegradates were detected, with two of the photoproducts formed at greater than 10% of the applied radioactivity; the photoproducts were simple rearrangements where the pyrimidine ring being substituted either ortho or meta onto the phenoxy ring.

In an acceptable adsorption/desorption study (MRID 00142919), flurprimidol was studied using both batch equilibrium and aged leaching column methods. In the batch equilibrium portion of the study, flurprimidol was applied at 0.20 to 25 µg/ml in two sand soils, three sandy loam soils, one clay loam soil, and two loam soils. Freundlich K_d values ranged from 0.12 to 4.9 while Koc values ranged from 140 to 535 with corresponding 1/N values of 0.737 to 0.904. At 0.2 to 800 µg/ml, flurprimidol was mobile with Freundlich K_d values of 2.56 in a sandy loam soil and 9.35 mL/g in a loam soil with corresponding K_{oc} values of 369 and 404 mL/g_{oc}. Flurprimidol was also studied in both aged and unaged leaching columns. The aged leaching column study was not considered acceptable because the incubation period of 7 days was not considered sufficient. In the unaged study, between 0.74% and 1.04% of applied flurprimidol was found in the leachate. An additional supplemental study (MRID 00117919) was submitted which provided data on the potential adsorption/desorption of flurprimidol. Flurprimidol applied at 0.0142 to 1.68 g/ml was studied in a single sandy loam soil and found to have a Freundlich K_d of 1.7 mL/g. Finally, an additional supplemental aged leaching study (MRID 00117920) was submitted which indicated that flurprimidol residues in soil aged for 30 days on sandy loam indicated 7.3% of radioactivity was present in leachate. The study was classified as supplemental because degradates were not analyzed for in this study.

In an acceptable terrestrial field dissipation study (MRID 40184403) flurprimidol dissipation was studied on turf covered sites in Florida, Tennessee, and Indiana. Flurprimidol was applied at between 0.75 and 1.5 lbs a.i./acre and degraded from the upper 6 inches (soil, thatch, and grass) with half lives between 5 and 23 days. Flurprimidol was not detected in the 6 to 12 inch or 12 to 18 inch depths and was below the detection limit (0.01 ppm) in the control plots. Flurprimidol did not degrade during transport with recoveries between 102% and 116% of the fortified amount. Flurprimidol was stable to storage for 3 months with greater than 96% remaining in frozen samples, however did degrade to 77% after 9 months. Reportedly, all field samples were analyzed within two months of collection. The registrants suggest that the rapid dissipation of flurprimidol from the sites was due to a combination of factors including uptake, metabolism, photolysis, microbial degradation and possibly volatilization.

In a supplemental soil dissipation study (MRID 40401007), flurprimidol was applied to a bareground sites in Indiana and Mississippi at 1.75 lbs a.i./acre. At the Indiana site, flurprimidol dissipated with a half life of approximately 9 months in the 0 to 3 inch depth with a calculated (regression analysis) half life of 80.6 weeks was calculated although this value is suspect because it exceeds the duration of the study (which was terminated at 37 weeks due to destruction of the site). At the Mississippi site, flurprimidol dissipated with an approximate half life of 4 to 9 months. The purpose of the study was to determine if flurprimidol was likely to leach and the

data suggest that the compound has a moderate potential to leach when applied to bare soil. The results of this study, viewed in conjunction with the results of the previous field dissipation study (MRID 40401007) suggest that the presence of plants in the field will drive the removal of flurprimidol from soil. However, what is not clear from the results of these studies is how much flurprimidol remains in the plant and what effect incomplete plant coverage might have on dissipation in the field.

In an acceptable bioconcentration factor study (MRID 40401001) flurprimidol was found to 19.3x in edible tissues, 52.3x in nonedible tissues, and 6.2x in whole fish. Specifically, juvenile bluegill sunfish were exposed to flurprimidol at 0.425 ppm for 28 days under flow-through conditions. Maximum mean residue levels were 8.2 ppm in edible tissues, 22.4 ppm in nonedible tissues, and 14.9 ppm in the whole fish. After 28 days of exposure, flurprimidol comprised 52% and 55% of total radioactivity in the edible and nonedible tissues respectively. Two major degradates identified were approximately 20% of applied. Several minor degradates were also detected. Water concentrations ranged from 0.410 ppm to 0.455 ppm. After 16 days of depuration, flurprimidol residues were 0.05 ppm in edible tissues, 0.15 ppm in nonedible tissues, and 0.09 ppm in the whole fish

Summary of Environmental Chemistry and Fate Properties of Flurprimidol				
Parameter	Value			Reference/Comments
Selected Physical/Chemical Parameters				
Vapor pressure (25 °C)	3.64 x 10 ⁻⁷ mm Hg			00162772
log K _{OW}	2.96			40401001
Persistence				
Hydrolysis t _{1/2}				
pH 5	pH 5 - stable			
pH 7	pH 7 - stable			
pH 9	pH 9 - stable			00117921
Photolysis t _{1/2} in water	1.4 days			00142917, 40401006, 40858503, 41228001, 00117922
Photolysis t _{1/2} on soil	No data			
Soil metabolism aerobic t _{1/2} 24–25 °C	482 days			00117918
Soil metabolism anaerobic t _{1/2}	stable			40858504
Aquatic metabolism aerobic t _{1/2}	No data			
Aquatic metabolism anaerobic t _{1/2}	No data			
Mobility/Adsorption-Desorption				
Batch equilibrium – unaged	Soil Textural Classification	Kd	Koc	00142919, 00117919, 00117920
	sand	3.09	535	
	sandy loam	1.86	268	

Summary of Environmental Chemistry and Fate Properties of Flurprimidol			
Parameter	Value		Reference/Comments
	loam	3.11	283
	clay loam	4.77	266
	loam	4.9	212
	sandy loam	0.89	140
	sand	0.12	208
	sandy loam	3.46	333
Laboratory volatility	NA		NA
	<i>Field Dissipation</i>		
Terrestrial field dissipation	5 to 23 days–cropped		40184403
	80 weeks–bare soil		40401007
Aquatic field dissipation	NA		NA
	<i>Bioaccumulation</i>		
Accumulation in fish,	19.3x - edible tissues		
maximum BCF	52.3x - nonedible tissues		
	6.2x - whole fish		40401001

2. Measures of Aquatic Exposure

Aquatic exposure modeling follows a tiered approach in order to efficiently allocate resources to assessment efforts of varying complexities. Tier I aquatic exposure modeling aims to provide an upper-bound (or high-end) Estimated Environmental Concentration (EEC) by modeling a site that is highly vulnerable to runoff or leaching. Consequently, if these conservative EECs yield risk quotients that fall below the Agency's Level of Concern (LOC) for aquatic organisms, actual risk to aquatic organisms may be unlikely. If a Tier I EEC yields a risk quotient higher than an LOC, the assessment must be refined to be more reflective of actual use site conditions.

a. GENEEC2 Exposure Modeling

Tier I aquatic exposure modeling relies on GENEEC2¹ (Generic Estimated Environmental Concentration) (USEPA, 2001), a screening model that is non-specific to crop and use-site. The model estimates upper-bound pesticide exposure in surface water using basic chemical properties, proposed application rates and methods, adsorption of the pesticide to soil or sediment, direct deposition of spray drift into the water body, and degradation of the pesticide in soil before runoff and within the water body. The GENEEC2 model estimates upper-bound pesticide surface water concentrations in a generic farm pond scenario by incorporating the following conservative assumptions:

- Input values for application rate and number of applications are the labeled maxima.
- The entire watershed is cropped and treated with the pesticide, and the 10-hectare watershed area is high relative to the 20,000-liter volume of the water body.

¹ <http://www.epa.gov/oppefed1/models/water/index.htm>.

- There is no buffer between the pond and the treated field.
- Runoff is a 6-inch rainfall event over a 24-hour period.
- The geographic location of use is representative of high-end potential for pesticide runoff and is not necessarily representative of runoff conditions for the labeled use.

EFED has developed a tiered approach for modeling aquatic exposures. This tiered system is designed to minimize the amount of analysis which is required to evaluate any given chemical. Each of the tiers is designed to screen out pesticides by requiring higher, more complex levels of investigation only for those that have not passed the previous tier. Each tier screens out a percentage of pesticides from having to undergo a more rigorous pre-registration review. 'Passing' a given assessment tier indicates that there is a low possibility of risk to the aquatic environment. 'Failing' an assessment tier, however, does not mean the chemical is likely to cause environmental problems, but that the assessment should continue on to the next higher assessment tier. The end result of this tiered modeling system will ideally be as thorough an analysis as is necessary for each pesticide and will focus greatest resources and efforts toward areas of greatest potential ecological threat. OPP does not take significant regulatory action based upon the results of screening models.

For flurprimidol, EFED has conducted a Tier I screening level modeling effort (**Appendix A**). In doing so, EFED has relied on the GENERIC Estimated Exposure Concentration model version 2 (GENEEC2) to estimate flurprimidol concentrations in surface water. GENEEC2 was designed to mimic a much more sophisticated PRZM/EXAMS simulation but requires far fewer inputs and much less time and effort to use. The model uses a candidate chemical's basic use and application information, its soil/water partition data and its degradation rate values to estimate high level exposure values in the same EFED "standard" agricultural field/farm pond scenario as used with PRZM/EXAMS simulations. The program is generic in that it does not consider differences in climate, soils, topography or crop in estimating potential pesticide exposure.

GENEEC2 is also simpler in its treatment of hydrology. The linked PRZM and EXAMS models simulate the impact of daily weather on the treated agricultural field over a period of thirty-six years. During this time, pesticide is washed-off of the field into the water-body by twenty to forty rainfall/runoff events per year. Each new addition of pesticide to the water-body adds to the pesticide which has arrived earlier either through previous runoff events or through spray-drift and begins degradation on the day it reaches the water. GENEEC2, on the other hand, is a single event model. It assumes one single large rainfall/runoff event occurs and removes a large quantity of pesticide from the field to the water all at one time. Longer-term, multiple-day average concentration values are calculated based on the peak day value and subsequent values considering degradation processes.

Exposure concentrations of flurprimidol in aquatic ecosystem assessments were estimated using the Tier I GENEEC2 model. Model input parameters were selected according to standard input guidance and are tabulated in **Table III-2**.

Table III-2. GENEEC2 Input Parameters for Flurprimidol for Aquatic Ecological Exposure Assessment

Model Parameter	Value	Comments ¹	Source
Application Information	- See Table III-1		Product Labels
Spray Drift by Scenario	ground - 1%; granular - 0%	Default Assumption	
Aerobic Soil Metabolism (t _{1/2})	1444 days ¹	3 x a single aerobic soil metabolism half life of 482 days	MRID 00117918
Aerobic Aquatic Degradation (t _{1/2})	Stable ¹	no data	
Aqueous Photolysis (t _{1/2})	1.4 days	single value	MRID 00142917, 40401006, 40858503, 41228001, 00117922
Hydrolysis	pH 7 - stable		MRID 00117921
Kd	2.78 mL/g	average K _d	MRID 00142919, 00117919, 00117920
Water Solubility	130 mg/L		Product Chemistry

¹ USEPA. 2009. *Guidance for Selecting Input Parameters in Modeling the Environmental Fate and Transport of Pesticides, Version 2.1.*

b. GENEEC2 Modeling Results

Aquatic EECs generated from GENEEC2 for the labeled uses of flurprimidol on terrestrial outdoor and residential sites are listed in **Table III-3**. These results represent peak and 4-, 21-, 60-, and 90-day average estimates of surface water concentrations in the standard farm pond for use as acute and chronic exposure endpoints. The results for the maximum exposure scenarios, appropriate for use in calculating baseline risk quotients, are presented in bold; other values are provided for characterization purposes. Model output files for these estimates are in **Appendix A**.

Table III-3. Estimated Aquatic Exposures of Flurprimidol in Surface Water Estimated Using GENEEC2

Crop	Rate (lbs a.i./A)	No. of Apps.	Minimum Interval (days)	Peak (µg a.i./L)	21-Day Average (µg a.i./L)	60-Day Average (µg a.i./L)
Turfgrasses and Ornamentals	0.26 ^a -Spray	12	14	127.64	123.73	116.56
	0.69 ^b -Spray	5	56	138.32	134.08	126.31
	0.75 -Spray	4	14	126.97	123.08	115.96
	0.75 -Granular	4	21	116.99	113.34	106.71
	1.5- Granular	2	56	117.19	113.53	106.89
	3.0 -Granular	1	N/A	118.76	115.06	108.33

^a Twelve applications at 0.26 lb a.i./A exceeds the annual label limit of 3.08 lb a.i./A per year.

^b Five applications at 0.69 lb a.i./A exceeds the annual label limit of 3.08 lb a.i./A per year.

c. PRZM/EXAMS Exposure Modeling

Tier II PRZM/EXAMS² modeling was conducted to address aquatic exposure issues for aquatic vascular plants. Input parameters for PRZM/EXAMS modeling are shown in **Table III-4**. These results represent the 1 in 10 year peak and 4-, 21-, 60-, and 90-day average estimates of surface water concentrations in the standard farm pond for use as acute and chronic exposure endpoints.

Table III-4. Summary of Flurprimidol Environmental Fate Data Used for the Aquatic Ecological Effects Assessment Inputs for Tier II PRZM/EXAMS Modeling			
Fate Property	Input Value	Comments	MRID (or source)
Molecular Weight	312.3 g/mol		Product Chemistry
Aqueous Solubility	130 mg/L		Product Chemistry
Aqueous Photolysis Half-Life	1.4 days		00142917, 40401006, 40858503, 41228001, 00117922
Vapor pressure (25 °C)	3.64 x 10 ⁻⁷ mm Hg		00162772
Aerobic Soil Metabolism Half-Life	1444 days	3 x a single aerobic soil metabolism half life of 482 days ¹	00117918
Hydrolysis Half-Life	Stable		00117921
Aerobic Aquatic Metabolism Half-Life	Stable	No data	USEPA, 2009 ¹
Anaerobic Aquatic Metabolism	Stable	No data	USEPA, 2009
K _d	2.78 mL/g	Average K _d ¹	00142919, 00117919, 00117920

¹ USEPA. 2009. *Guidance for Selecting Input Parameters in Modeling the Environmental Fate and Transport of Pesticides, Version 2.1*.

d. PRZM/EXAMS Modeling Results

Aquatic EECs generated from PRZM/EXAMS for the labeled uses of flurprimidol on terrestrial outdoor and residential sites are listed in **Table III-5**. PRZM/EXAMS models provide a 1-in-10 year peak and 4-, 21-, 60-, and 90-day average estimates of surface water concentrations in the standard farm pond for use as acute and chronic exposure endpoints. However, because RQs for aquatic plants are based on the aquatic plant toxicity and peak EECs, only the peak EECs are tabulated in **Table III-5**. Model output files for these estimates are in **Appendix B**.

² <http://www.epa.gov/oppefed1/models/water/index.htm>.

Table III-5. Scenario, Date of First Application, Application Rate, Number of Applications, Reapplication Interval, Formulations, and Peak EECs Considered in Limit PRZM/EXAMS Modeling.

Scenario – State Use Site	Date of 1st application (month-day)	Application Rate (lb ai/ac)	No. of Applications	Reapplication Interval	Formulation ¹ (CAM) ²	Peak EEC (µg a.i./L)
FL Nursery	08-08	3.00	1	n/a	Granular (1)	74.94
MI Nursery	03-08	3.00	1	n/a	Granular (1)	29.19
MI Nursery	03-08	1.50	2	60	Granular (1)	41.40
NJ Nursery	03-07	0.75	4	21	Ground Spray (2)	40.83
NJ Nursery	05-20	0.75	4	21	Ground Spray (2)	58.13
NJ Nursery	05-08	0.75	4	21	Ground Spray (2)	58.47
PA turf	05-07	0.75	4	21	Ground Spray (2)	24.43
PA turf	06-05	0.26	12	14	Ground Spray (2)	18.19
PA turf	05-05	0.26	12	14	Ground Spray (2)	15.70

¹ For granular formulations: spray drift was assumed to be 0% and application efficiency was assumed to be 100%; for ground spray drift was assumed to be 1% and application efficiency was assumed to be 99% (USEPA, 2009)

² CAM is Chemical application method and is an input parameter in the PRZM model.

3. Aquatic Exposure Monitoring and Field Data

For flurprimidol, no monitoring data were available for use in this aquatic exposure assessment. Therefore, potential exposure of non-target organisms to flurprimidol in surface water was evaluated through modeling.

4. Measures of Terrestrial Exposure

Terrestrial wildlife exposure estimates are typically calculated for birds and mammals, emphasizing a dietary exposure route for uptake of pesticide active ingredients. These exposures are considered as surrogates for terrestrial-phase amphibians as well as reptiles. For exposure to terrestrial wildlife, such as birds and small mammals, pesticide residues on food items or ground surfaces are estimated, based on the assumption that animals are exposed to a single pesticide residue in a given exposure scenario.

For flurprimidol spray applications applied to foliar surfaces, estimation of pesticide concentrations in wildlife food items (mg ai/kg diet) focuses on quantifying possible dietary ingestion of residues on vegetative matter and insects. For granular and liquid formulations applied to ground surfaces, estimation of pesticide concentrations on the ground (mg ai/sq ft) focuses on quantifying possible dietary ingestion of residues on the ground.

a. Birds and Mammals

No field residue data or field study information is available for flurprimidol; therefore, the residue estimates were based on a nomogram that relates food item residues to pesticide

application rate. The residue EECs were generated from a spreadsheet-based model (T-REX version 1.4.1; USEPA, 2001) that calculates the decay of a chemical applied to foliar surfaces for single or multiple applications, and is based on the methods of Hoerger and Kenaga (1972) as modified by Fletcher *et al.* (1994). EECs were calculated using a foliar dissipation default half-life of 35 days (Willis and McDowell, 1987). Uncertainties in the terrestrial EECs are primarily associated with a lack of data on interception and subsequent dissipation from foliar surfaces. T-REX does not differentiate between backpack sprayer, spot treatment, and ground boom applications, the method of application is not considered; thus, these methods are not evaluated.

Acute exposures from granular and liquid formulations applied to ground surfaces are estimated using the LD₅₀/sq ft analysis in T-REX. Estimation of pesticide concentrations (mg ai/ft²) for granules and liquid focuses on quantifying possible dietary ingestion of residues on ground surfaces. The equation used to calculate mg a.i./ft² EECs is presented below for broadcast granular and liquid applications to ground surfaces. Acute exposure from “banded” applications is uncertain since T-REX does not have the capability to assess risk to terrestrial animals from “banded” applications that are applied around the perimeter/edge of lawns, sidewalks, parking lots, and building structures; thus, EECs for “banded” applications will be calculated using the same equation below assuming that a “banded” application is equivalent to a broadcast application. However, this assumption leads to an overestimation of the EECs since the entire acre will not be completely treated when “banded” applications are applied solely on the edge of an area.

Broadcast granular/liquid applications to ground surfaces: $\text{mg a.i./ft}^2 = (\text{application rate} \times \% \text{ a.i.} \times 453,590 \text{ mg/lb}) / 43,560 \text{ ft}^2/\text{acre}$

To provide potential maximum exposures to non-target birds and mammals based on proposed label uses of flurprimidol on turfgrasses and ornamentals, residue EECs were calculated using six pesticide exposure scenarios: four broadcast spray application at 0.75 lb a.i./A with 2-week reapplication intervals, twelve broadcast applications at 0.26 lb a.i./A with 2-week intervals, five broadcast spray application at 0.69 lb a.i./A with 8-week intervals, four broadcast application of granules at 0.75 lb a.i./A with 3-week intervals, one broadcast application of granules at 3.0 lb a.i./A, and two broadcast application of granules at 1.5 lb a.i./A with 8-week intervals.

The active ingredient EECs on terrestrial food items and granules may be compared directly with dietary toxicity data or converted to an oral dose. The residue concentration is converted to daily oral dose based on the fraction of body weight consumed daily as estimated through allometric relationships. The risk assessment for flurprimidol uses upper bound predicted residues as the measure of exposure; however, mean EECs are also presented for characterization purposes.

Tables III-6, III-7, and III-8 provide dietary- and dose-based EECs for broadcast spray applications to foliar surfaces, **Table III-9** provides intermediate EECs for “banded” spray applications to ground surfaces, **Table III-10** provides intermediate EECs for broadcast granular applications to ground surfaces, and **Table III-11** provides intermediate EECs for “banded” granular applications to ground surfaces.

Table III-6. Terrestrial Dietary-Based EECs (Bird and Mammal) Following Flurprimidol Broadcast Spray Application to Foliar Surfaces.				
Uses	# of App. x App. Rate	Food Items	Upper Bound EEC ¹ (mg ai/kg)	Mean EEC ² (mg ai/kg)
Turf grass / Ornamentals	4 applications at 0.75 lb ai/A with 2 week intervals	Short Grass	498.15	176.43
		Tall Grass	228.32	74.72
		Sm. Insects, Broadleaf Plants	280.21	93.4
		Lg. Insects, Fruits, Pods	31.13	14.53
	12 applications at 0.26 lb ai/A with 2 week intervals	Short Grass	248.45	87.99
		Tall Grass	113.84	37.27
		Sm. Insects, Broadleaf Plants	139.75	46.58
		Lg. Insects, Fruits, Pods	15.53	7.25

¹ Used to determine the potential risk to non-target wildlife and the need to consider regulatory action.

² Used to further evaluate the likelihood of adverse ecological effects to non-target species.

Table III-7. Terrestrial Dose-Based EECs (Birds) Following Flurprimidol Broadcast Spray Application to Foliar Surfaces.					
Uses	# of App. x App. Rate	Food items	Avian Classes and Body Weights		
			small	mid	large
			20 g	100 g	1000 g
Upper Bound EEC (mg ai/kg) ¹					
Turf grass / Ornamentals	4 applications at 0.75 lb ai/A with 2 week intervals	Short Grass	567.34	323.52	144.84
		Tall Grass	260.03	148.28	66.39
		Sm. Insects, Broadleaf Plants	319.13	181.98	81.48
		Lg. Insects, Fruits, Pods	35.46	20.22	9.05
	12 applications at 0.26 lb ai/A with 2 week intervals	Short Grass	282.96	161.36	72.24
		Tall Grass	129.69	73.95	33.11
		Sm. Insects, Broadleaf Plants	159.16	90.76	40.64
		Lg. Insects, Fruits, Pods	17.68	10.08	4.52
Mean EEC (mg ai/kg) ²					
Turf grass / Ornamentals	4 applications at 0.75 lb ai/A with 2 week intervals	Short Grass	200.93	114.58	51.30
		Tall Grass	85.10	48.53	21.73
		Sm. Insects, Broadleaf Plants	106.38	60.66	27.16
		Lg. Insects, Fruits, Pods	16.55	9.44	4.22
	12 applications at 0.26 lb ai/A with 2 week intervals	Short Grass	100.21	57.15	25.59
		Tall Grass	42.44	24.20	10.84
		Sm. Insects, Broadleaf Plants	53.05	30.25	13.55
		Lg. Insects, Fruits, Pods	8.25	4.71	2.11

¹ Used to determine the potential risk to non-target wildlife and the need to consider regulatory action.

² Used to further evaluate the likelihood of adverse ecological effects to non-target species.

Table III-8. Terrestrial Dose-Based EECs (Mammals) Following Flurprimidol Broadcast Spray Application to Foliar Surfaces.								
Uses	# of App. x App. Rate	Food items	Mammal Classes and Body Weights					
			Herbivores / Insectivores			Granivores		
			small 15 g	mid 35 g	large 1000 g	small 15 g	mid 35 g	large 1000 g
Upper bound EEC (mg ai/kg) ¹								
Turf grass / Ornamentals	4 applications at 0.75 lb ai/A with 2 week intervals	Short Grass	474.94	328.25	76.11			
		Tall Grass	217.68	150.45	34.88			
		Sm. Insects, Broadleaf Plants	267.16	184.64	42.81			
		Lg. Insects, Fruits, Pods	29.68	20.52	4.76	6.60	4.56	1.06
	12 applications at 0.26 lb ai/A with 2 week intervals	Short Grass	236.88	163.71	37.96			
		Tall Grass	108.57	75.04	17.40			
		Sm. Insects, Broadleaf Plants	133.24	92.09	21.35			
		Lg. Insects, Fruits, Pods	14.80	10.23	2.37	3.29	2.27	0.53
Mean EEC (mg ai/kg) ²								
Turf grass / Ornamentals	4 applications at 0.75 lb ai/A with 2 week intervals	Short Grass	168.21	116.26	26.95			
		Tall Grass	71.24	49.24	11.42			
		Sm. Insects, Broadleaf Plants	89.05	61.55	14.27			
		Lg. Insects, Fruits, Pods	13.85	9.57	2.22	3.08	2.13	0.49
	12 applications at 0.26 lb ai/A with 2 week intervals	Short Grass	83.89	57.98	13.44			
		Tall Grass	35.53	24.56	5.69			
		Sm. Insects, Broadleaf Plants	44.41	30.70	7.12			
		Lg. Insects, Fruits, Pods	6.91	4.77	1.11	1.54	1.06	0.25

¹ Used to determine the potential risk to non-target wildlife and the need to consider regulatory action.

² Used to further evaluate the likelihood of adverse ecological effects to non-target species.

Table III-9. Terrestrial EECs (mg ai/ft²) Following Flurprimidol “Banded” Spray Applications to Ground Surfaces^{1,2}			
Uses	# of App. x App. Rate	Intermediate Calculations	EEC
Turf grass and Ornamentals	One (broadcast) spray application at 0.69 lb ai/A	# rows acre-1:	N/A
		row length (ft):	N/A
		lb ai/1000 ft row:	N/A
		bandwidth (ft):	N/A
		mg ai/ft ² (EEC):	7.18

¹ T-REX does not have the capability to calculate EECs based on “banded” applications in a residential setting; therefore, EECs are based on broadcast applications.

² Accounts only for a single application, not multiple applications

Table III-10. Terrestrial EECs (mg ai/ft²) Following Flurprimidol Broadcast Granular Applications to Ground Surfaces			
Uses	# of App. x App. Rate	Intermediate Calculations	EEC
Turf grass and Ornamentals	One broadcast application of granules at 0.75 lb ai/A	# rows acre-1:	N/A
		row length (ft):	N/A
		lb ai/1000 ft row:	N/A
		bandwidth (ft):	N/A
		mg ai/ft ² (EEC):	7.81
	One broadcast application of granules at 3.0 lb ai/A	# rows acre-1:	N/A
		row length (ft):	N/A
		lb ai/1000 ft row:	N/A
		bandwidth (ft):	N/A
		mg ai/ft ² (EEC):	31.24

Table III-11. Terrestrial EECs (mg ai/ft²) Following Flurprimidol “Banded” Granular Applications to Ground Surfaces^{1,2}			
Uses	# of App. x App. Rate	Intermediate Calculations	EEC
Turf grass and Ornamentals	One (broadcast) application of granules at 1.5 lb ai/A	# rows acre-1:	N/A
		row length (ft):	N/A
		lb ai/1000 ft row:	N/A
		bandwidth (ft):	N/A
		mg ai/ft ² (EEC):	15.62

¹ T-REX does not have the capability to calculate EECs based on “banded” applications in a residential setting; therefore, EECs are based on broadcast applications.

² Accounts only for a single application, not multiple applications

Chronic exposures from flurprimidol granules are estimated using the earthworm fugacity model. Estimation of pesticide concentrations in earthworms (mg/kg-earthworm) focuses on quantifying possible dietary ingestion of residues bioaccumulated in earthworms (Table III-12). Then, the bioconcentrated earthworms (mg/kg-earthworm) are compared to terrestrial animal NOAEC values (mg a.i./kg) to estimate the potential for chronic risk to birds or mammals associated with direct ingestion of earthworms. Equation used to calculate the concentration of flurprimidol in the tissues of earthworm is presented below. More information on the equation can be found in Appendix D. Table III-12 presents the highest exposure scenario of the proposed use scenarios.

$$C_{\text{earthworm}} = [(C_{\text{soil}})(Z_{\text{earthworm}}/Z_{\text{soil}})] + [(C_{\text{soil water}})(Z_{\text{earthworm}}/Z_{\text{water}})]$$

Table III-12. Dose-based and Dietary-based EECs for Insectivorous Birds and Mammals on Soil Invertebrate Consumption			
Application Rate	Body Weight (g)	Daily fresh food intake (kg/day) ^a	Earthworm EEC ^b (mg/kg-earthworm)
3.0 lb a.i./A	Avian, Dose-based		
	20	0.02	0.04
	100	0.07	0.02
	1000	0.3	0.01
	Avian, Dietary-based		
	All	0.035	
	Mammal, Dose-based		
	15	0.01	0.03
	35	0.02	0.02
	1000	0.2	0.005

^a Food Intake = $(0.648 \times BW^{0.651} / (1-W)) / (BW \text{ assessed})$; BW = body mass of bird or mammals in grams, W = % water in food.

^b Dose-based Earthworm EECs = Food Intake x Dietary-based Earthworm EEC / BW

b. Soil-Dwelling Invertebrates

Soil EECs for soil-dwelling invertebrates are estimated by converting the application rate of lb/A to mg/kg soil, using a soil density of 1.3 g/cm³. The highest exposure scenario of all proposed use scenarios is presented in Table III-13.

Table III-13. Soil EECs (mg ai/kg-soil) Following Flurprimidol Granular Applications			
Uses	Application Rate	Soil Density	EECs (mg/kg-soil)
Turf grass and Ornamentals	3.0 lb ai/A	1.3 g/cm ³	8.57

c. Terrestrial Plants

TerrPlant (USEPA, 2006), a Tier I model, predicts EECs for terrestrial plants located in dry and semi-aquatic areas adjacent to the treated field. The active ingredient EECs are based on the application rate, soil incorporation, runoff fraction, drift fraction and solubility of the pesticide in water and drift characteristics, which depend on ground and aerial applications. The amount of flurprimidol that runs off is a proportion of the application rate and is assumed to be 5% based on flurprimidol solubility of 130 mg ai/L in water. Drift from ground and granular applications are assumed to be 1% and 0%, respectively, of the application rate. TerrPlant does not differentiate between banded or broadcast applications; thus, the only method of application considered in this model is ground unincorporated application.

For a standard scenario on an agricultural field when applications are occurring on land, EFED's runoff scenario for terrestrial plants inhabiting dry areas adjacent to a field is characterized as "sheet runoff" (one treated acre to an adjacent acre: a 1:1 ratio) and inhabiting semi-aquatic or wetland areas adjacent to a field is characterized as "channelized runoff" (10 treated acre to a distant low-lying acre: a 10:1 ratio). Details of the TerrPlant model and EECs are presented in Table III-14 and in Appendix E.

TABLE III-14. EECs from Spray or Granules for Terrestrial Plants Located Adjacent to Flurprimidol Treated Sites.				
Application Rate	Application Method ⁴	Concentration (lbs ai/A)		
		Total Loading to Areas Adjacent to Treated Areas ¹	Total Loading to Semi-Aquatic Areas Adjacent to Treated Areas ²	Drift to Adjacent Areas ³
0.75 lb ai/A	Spray	0.045	0.3825	0.0075
	Granules	0.0375	0.375	None
0.26 lb ai/A	Spray	0.0156	0.1326	0.0026
1.5 lb ai/A	Granules	0.075	0.75	None
3.0 lb ai/A	Granules	0.15	1.5	None

¹ EEC = Sheet Runoff + Drift (1% for ground; 0% for granules)

² EEC = Channelized Runoff + Drift (1% for ground; 0% for granules)

³ EEC for ground (appl. rate x 1% drift); for granules (appl. rate x 0% drift)

⁴ EEC for Unincorporated Ground Spray Application

IV. Ecological Effects Characterization

With the submission of new ecological toxicity data on avian reproduction, seedling emergence, vegetative vigor, aquatic vascular plant, freshwater fish early life-stage, and freshwater invertebrate life cycle, the ecological effects profile for flurprimidol has been updated. A more robust discussion of acute toxicity to aquatic and terrestrial animals can be found in the previous risk assessment (D292874, D310484, D315363, and D315836). The key toxicity endpoints used in this assessment are summarized in Tables IV-1 and IV-2 below.

A. Aquatic Effects Characterization

Table IV-1 presents the most sensitive toxicity endpoints used to estimate risk to aquatic receptors from exposure to flurprimidol.

Table IV-1. Flurprimidol Toxicity Profile for Aquatic Animals and Plants					
Taxon	Exposure Duration	Most Sensitive Species Tested	Toxicity Value	Toxicity Category	MRID / Classification
Freshwater Fish	Acute	Bluegill Sunfish <i>Lepomis macrochirus</i>	LC ₅₀ = 17.2 mg ai/L	Slightly toxic	00117925 (acceptable)
	Chronic	Fathead minnow <i>Pimephales promelas</i>	NOAEC = 0.939 mg ai/L LOAEC = 1.75 mg ai/L Reductions in fry survival, length, and weight.	Not applicable	47459602 (acceptable)
Estuarine/ Marine Fish	Acute	Not required at this time			
Freshwater Invertebrates	Acute	Water Flea <i>Daphnia magna</i>	EC ₅₀ = 11.8 mg ai/L	Slightly toxic	00117927 (acceptable)
	Chronic	Water Flea <i>Daphnia magna</i>	NOAEC = 2.95 mg ai/L LOAEC = 5.70 mg ai/L Reductions of young per adult and adult length, as well as significant difference in day of first brood when compared to control	Not applicable	47459601 (acceptable)
Estuarine/ Marine Invertebrates	Acute	Not required at this time			
Vascular plant	Acute	Duckweed <i>Lemna gibba</i>	EC ₅₀ = 8.5 µg ai/L NOAEC = 0.89 µg ai/L Reduction in # of fronds	Not applicable	47472101 (supplemental)
Non-vascular plant	Acute	Green algae <i>Selenastrum capricornutum</i>	EC ₅₀ = 0.84 mg ai/L NOAEC = 0.28 mg ai/L Reduced biomass	Not applicable	40401011 (acceptable)

B. Terrestrial Effects Characterization

Table IV-2 presents the most sensitive toxicity endpoints used to estimate risk to terrestrial receptors from terrestrial exposures of flurprimidol.

Table IV-2. Flurprimidol Toxicity Profile for Terrestrial Animals and Plants					
Taxon	Exposure Duration	Most Sensitive Species Tested	Toxicity Value	Toxicity Category	MRID Reference
Mammals	Acute	Rat <i>Rattus norvegicus</i>	LD ₅₀ = 709 mg ai/kg bw	Slightly toxic	00117932 (acceptable)
	Chronic	Rat <i>Rattus norvegicus</i>	NOAEL = 100 mg ai/kg diet (7.3 mg ai/kg-bw/day) LOAEL = 1000 mg ai/kg diet Decreased mating, fertility, and fetal survival (stillbirths) in both generations and increased incidence of persistent vaginal estrous and no corpora lutea.	Not applicable	00162770

Table IV-2. Flurprimidol Toxicity Profile for Terrestrial Animals and Plants

Taxon	Exposure Duration	Most Sensitive Species Tested	Toxicity Value	Toxicity Category	MRID Reference
Non-passerine Birds	Acute Oral	Bobwhite quail <i>Colinus virginianus</i>	LD ₅₀ >2000 mg ai/kg bw	Practically nontoxic	00117928 (acceptable)
	Acute Dietary	Bobwhite quail <i>Colinus virginianus</i>	LC ₅₀ >4310 mg ai/kg diet	Practically nontoxic	00117929 (supplemental)
	Chronic	Mallard duck <i>Anas platyrhynchos</i>	NOAEC = 309 mg ai/kg diet LOAEC = 642 mg ai/kg diet Reductions in egg production, embryo survival, and hatchability	Not applicable	47459603 (acceptable)
Passerine Bird	Acute	No data	No data	Not determined	No data
Beneficial Insects	Acute	Honey Bee <i>Apis mellifera</i>	LD ₅₀ >100 µg a.i./bee	Relatively nontoxic ¹	40401004 (acceptable)
Terrestrial Invertebrates	Acute	Earthworm <i>Lumbricus terrestris</i>	LD ₅₀ >100 mg ai/kg	Practically nontoxic	00117931 (supplemental)
Terrestrial Plants - Seedling Emergence	Survival and growth	Ryegrass (monocot) <i>Lolium perenne</i>	EC ₂₅ = 0.14 lb ai/A NOAEC = 0.038 lb ai/A Reduced shoot length	N/A	47459606 (acceptable)
		Cucumber (dicot) <i>Cucumis sativa</i>	EC ₂₅ = 0.012 lb ai/A NOAEC = 0.0044 lb ai/A Reduced shoot length		
Terrestrial Plants - Vegetative Vigor		Ryegrass (monocot) <i>Lolium perenne</i>	EC ₂₅ = 0.42 lb ai/A NOAEC = 0.11 lb ai/A Reduced shoot length	N/A	47459607 (acceptable)
		Lettuce (dicot) <i>Lactuca sativa</i>	EC ₂₅ = 0.011 lb ai/A NOAEC = 0.046 lb ai/A Reduced shoot length		

¹ <http://bees.ucr.edu/tox.html>

V. RISK CHARACTERIZATION

To evaluate the potential risk to non-target organisms from the proposed use of flurprimidol, risk quotients (RQs) or LD₅₀/ft² are calculated from the ratio of estimated environmental concentrations (EECs) to ecotoxicity values. RQs and LD₅₀/ft² are then compared to the Agency's levels of concern (LOCs) used by OPP to indicate potential risk to non-target organisms. LOCs are the Agency's interpretive policy and are used to analyze potential risk to non-target or *listed* organisms and the need to consider regulatory action. These criteria are used to indicate when a pesticide's use as directed on the label has the potential to cause adverse effects on non-target or *listed* organisms. In the following risk characterization, when appropriate, the RQs for applications to foliar surfaces are calculated first then the LD₅₀/ft²s for applications to ground surfaces are calculated afterwards.

A. Risks to Aquatic Organisms and Plants

For this baseline risk assessment with aquatic organisms and plants, acute and chronic RQs (Table V-1) are derived based on ecological toxicity data for the active ingredient and then

compared to the EECs generated from GENEEC2. The peak EEC is used to calculate the acute RQs and the 21-day and 60-day average concentrations (EECs) are used to calculate chronic RQs for invertebrates and fish, respectively. Details of the acute and chronic GENEEC2 EEC calculations for aquatic animals and plants are provided in **Section III.2**. The potential risks to aquatic animals and plants are described further in the Risk Description section.

1. Freshwater Fish / Invertebrates

Minimal acute and chronic risks are expected for freshwater fish and invertebrates because no acute or chronic LOCs are exceeded (**Table V-2**) when flurprimidol is applied at the highest exposure among of a suite of use scenarios. Therefore, EFED expects minimal risk from maximum applications at other use scenarios, because aquatic EECs resulting from maximum applications to those scenarios are lower than the highest exposure scenario of five applications at 0.69 lb ai/A with a 56-day reapplication interval.

Use	# of App. x App. Rate x Interval	Freshwater Fish ³ (LC ₅₀ = 17.2 mg a.i./L ; NOAEC = 0.939 mg a.i./L)		Freshwater Invertebrate ⁴ (EC ₅₀ = 11.8 mg a.i./L ; NOAEC = 2.95 mg a.i./L)	
		Acute	Chronic	Acute	Chronic
Turf grass / Ornamentals	5 apps x 0.69 lb ai/A x 8 wks intervals (spray)	<0.01	0.13	<0.01	0.04

¹ LOC exceedances are bolded (Endangered Species LOC = 0.05; Acute Restricted LOC = 0.1; Acute Risk = 0.5 and Chronic LOC = 1).

² Tier I EECs from Table III-3.

³ Freshwater fish acute RQ = Peak EEC ÷ LC₅₀; chronic RQ = 60-day EEC ÷ NOAEC

⁴ Freshwater invertebrate acute RQ = Peak EEC ÷ EC₅₀; chronic RQ = 21-day EEC ÷ NOAEC

2. Estuarine/Marine Fish and Invertebrates

RQs are not calculated for estuarine/marine fish and invertebrates because there are no toxicity data available. However, data on estuarine/marine organisms are not needed at this time as it is unlikely that they would be sufficiently more sensitive than their freshwater counterparts such that Agency levels of concern would be exceeded.

3. Aquatic Plants I. Tier I EECs

Based on all exposure scenarios and peak GENEEC EECs, risks are expected for aquatic vascular plants because the *non-listed* and *listed plants* LOCs are exceeded (**Table V-3**) for vascular plants when flurprimidol is applied at the maximum application rates listed on the product label.

Of all exposure scenarios and GENEEC EECs, minimal risk is assumed for aquatic non-vascular plants from maximum application rates listed on the product label.

Table V-3. Risk Quotients for Aquatic Plants for Proposed Flurprimidol Uses as Plant Growth Regulator ^{1,2}					
Use	# of App. x App. Rate x Interval	Vascular Aquatic Plant ³ (EC ₅₀ = 0.085 mg ai/L; NOAEC = 0.0089 mg ai/L)		Non-Vascular Aquatic Plant ⁴ (EC ₅₀ = 0.84 mg ai/L; NOAEC = 0.28 mg ai/L)	
		Non-Listed	Listed	Non-Listed	Listed
Turf grass / Ornamentals	5 apps x 0.69 lb ai/A x 8 wks intervals (spray)	1.6	16	0.16	0.49
	12 apps. x 0.26 lb ai/A x 2 wks intervals (spray)	1.5	14	0.15	0.46
	4 apps x 0.75 lb ai/A x 2 wks intervals (spray)	1.5	14	0.15	0.46
	2 apps x 1.5 lb ai/A x 8 wks intervals (spray)	1.5	14	0.15	0.46
	1 app x 3.0 lb ai/A (granule)	1.4	13	0.14	0.42
	2 apps x 1.5 lb ai/A x 8 wks intervals (granule)	1.4	13	0.14	0.42
	4 apps x 0.75 lb ai/A x 3 wks intervals (granule)	1.4	13	0.14	0.42

¹ LOC exceedances are bolded (Non-listed Plant LOC >1; Listed Plant LOC > 1).

² Tier I EECs from Table III-3.

³ Non-listed vascular RQ = Peak EEC ÷ EC₅₀; listed vascular RQ = Peak EEC ÷ NOAEC

⁴ Non-listed non-vascular RQ = Peak EEC ÷ EC₅₀; listed non-vascular RQ = Peak EEC ÷ NOAEC

II. Tier II EECs

Since the Tier I EECs for aquatic vascular plants yield risk quotients higher than Agency's LOC, the assessment must be refined to be more reflective of actual use site conditions. Based on selected exposure scenarios and peak PRZM/EXAMS EECs, risks are expected because the *listed plant* LOC is still exceeded (Table V-4) for vascular plants when flurprimidol is applied at the maximum application rates listed on the product labels.

Table V-4. Risk Quotients for Aquatic Plants for Proposed Flurprimidol Uses as Plant Growth Regulator ^{1,2}						
Use	Scenarios	App. Rate / No. of Apps. / Intervals	Application Method	Peak EECs (µg a.i./L)	Vascular Aquatic Plant ³ (EC ₅₀ = 0.085 mg ai/L; NOAEC = 0.0089 mg ai/L)	
					Non-Listed	Listed
Turf grass / Ornamentals	FL Nursery	3 / 1 / 0	granular	74.94	0.88	8.42
	MI Nursery	3 / 1 / 0	granular	29.19	0.34	3.28
	MI Nursery	1.5 / 2 / 60	granular	41.40	0.49	4.65
	NJ Nursery	0.75 / 4 / 21	ground spray	40.83	0.48	4.59
	NJ Nursery	0.75 / 4 / 21	ground spray	58.13	0.68	6.53
	NJ Nursery	0.75 / 4 / 21	ground spray	58.47	0.69	6.57
	PA turf	0.75 / 4 / 21	ground spray	24.43	0.29	2.74
	PA turf	0.26 / 12 / 14	ground spray	18.19	0.21	2.04

	PA turf	0.26 / 12 / 14	ground spray	15.70	0.18	1.76
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¹ LOC exceedances are bolded (Non-listed Plant LOC >1; Listed Plant LOC > 1).

² Tier II EECs from Table III-5.

³ Non-listed vascular RQ = Peak EEC ÷ EC50; listed vascular RQ = Peak EEC ÷ NOAEC

⁴ Non-listed non-vascular RQ = Peak EEC ÷ EC50; listed non-vascular RQ = Peak EEC ÷ NOAEC

B. Risks to Terrestrial Animals

For this baseline assessment with terrestrial animals, acute and chronic risk indices for applications to foliar surfaces are derived based on ecological toxicity data for the active ingredient (ai), and then compared to the EECs generated from the T-REX model. Acute and chronic RQs are calculated by comparing the acute and chronic toxicity values of the AI to T-REX EECs generated based on spray applications to foliar surfaces, while acute LD₅₀/ft²s are calculated by comparing the acute toxicity values of the AI to T-REX EECs generated based on application to ground surfaces. With no methodology available for assessing chronic risk to birds and mammals from granular consumption, chronic LD₅₀/ft²s are calculated by comparing the chronic toxicity values of the AI to the highest EEC of flurprimidol in earthworm tissue. Terrestrial EECs (dose-based, dietary-based, or mg ai/ft²) were derived for the use of flurprimidol based on the six exposure scenarios developed for this baseline assessment. The potential risks to terrestrial animals are described further in the Risk Description section.

1. Birds and Mammals

In this subsection, two types of risk quotients for broadcast spray applications to foliar surfaces (e.g., short grass, broadleaves, and seeds) are calculated to evaluate the risks to birds and mammals based on the estimated dietary residue concentrations determined from the Kenaga nomogram: (1) dietary-based RQs; and (2) dose-based RQs. RQ calculations (Table V-5) are based on an adjusted LD₅₀ and exposure value (mg ai/kg-bw or mg ai/kg-diet). These RQs are not equivalent. Dietary risk quotients are calculated by directly comparing the concentration of a pesticide administered (or estimated to be administered) to experimental animals in the diet in a toxicity study to the concentration estimated to be on selected food items. These risk quotients do not account for the fact that smaller-sized animals need to consume more food relative to their body weight than larger animals or those differential amounts of food are consumed depending on the water content and nutritive value of the food. The dose-based risk quotients do account for these factors. The dose-based RQs incorporate the ingestion rate-adjusted exposure from the various food items to the different weight classes of birds and mammals and the weight class-scaled toxicity endpoints.

However, for spray and granular applications to ground surfaces, T-REX only allows LD₅₀/ft²s “dose-based RQs” calculations to evaluate only the acute risk to birds and mammals; thus, the “dietary-based RQs” and chronic risk were not calculated and excluded from the assessment for spray application and granular products. The LD₅₀/ft² method modeled by T-REX is used to estimate the magnitude by which the LD₅₀ is exceeded for a bird or mammal occupying one square foot of the treated area subjected to all routes of exposure. The LD₅₀/ft² method does not capture feeding behaviors of the animals that would increase exposure, such as incidental granule ingestion with soil, as birds may consume soil at a rate of 2 to 14% of daily diet (USEPA, 1993),

active consumption of granules due to their resemblance to grain seeds, or efforts to collect grit to assist in food breakdown. Since the granules are not incorporated in the ground, EFED assume that 100% of the granules applied will remain uncovered on the surface, available for consumption by terrestrial animals. LD₅₀/ft² calculations (Table V-6) are based on an adjusted LD₅₀ and exposure value (mg ai/ft²). Terrestrial animals may be exposed to granular pesticides ingesting granules when foraging for food or grit. Other routes also may expose them, such as by walking on exposed granules or direct ingestion of earthworm. The numbers of lethal doses (LD₅₀s) that are available within one square foot immediately after application (LD₅₀s/ft²) is used as the risk index for spray application and granular products applied to ground surfaces. LD₅₀s/ft²s are calculated by comparing the mg a.i./ft² to three separate weight class of birds: 1000 g (e.g., waterfowl), 100 g (e.g., upland gamebird), and 20 g (e.g., songbird) and three separate weight class of mammals: 1000 g, 35 g, and 15g.

Table V-5. Formulas used to calculate dose- and dietary-based risk quotients for spray applications to foliar surfaces.

Duration	Dose or Dietary RQ	Surrogate Organism	Equation
Acute	Dose-based	Birds and mammals	Acute Daily Exposure (mg/kg-bw) / adjusted LD ₅₀ (mg/kg-bw)
	Dietary-based	Birds only	Kenaga EEC (mg/kg-food item) / LC ₅₀ (mg/kg-diet)
Chronic	Dose-based	Mammals only	EEC (mg/kg-bw) / Adjusted NOAEL (mg/kg-bw)
	Dietary-based	Birds and mammals	EEC (mg/kg-food item) / NOAEC (mg/kg-diet)

Table V-6. Formula used to calculate dose-based LD₅₀/ft²s for applications to ground surfaces.

Duration	Dose or Dietary RQ	Surrogate Organism	Equation
Acute only	Dose-based only	Birds and mammals	EEC (mg/ft ²) / adjusted LD ₅₀ (mg/kg-bw)

Before the risk indices are calculated for birds and mammals, the EECs and toxicity values are adjusted based on food intake and body weight differences so that they are comparable for a given weight class of animal. The size classes assessed for birds are small (20-gram), medium (100-gram), and large (1000-gram), while the size classes assessed for mammals are small (15-gram), medium (35-gram), and large (1000-gram). However, extrapolation from one size class to another needs to consider differences in the scaling of toxicity for differences in body weight. For birds, only acute values (LD₅₀s) are adjusted because dose-based risk quotients are not calculated for the chronic risk estimation, while only chronic values are adjusted for mammals because dietary-based risk quotients are not calculated for the acute risk estimation.

For birds, the bobwhite quail LD₅₀ of >2000 mg/kg-bw is adjusted for birds of various sizes based on the following formula, recommended by Mineau *et al.* 1996:

$$\text{Adj. LD}_{50} = \text{LD}_{50} (\text{AW/TW})^{(a-1)}$$

where adj. LD₅₀ is the median 50% lethal dose for the species being assessed, LD₅₀ is the median lethal dose in the test organism, AW is the body weight of the assessed organism, TW is the body weight for the test organism, and *a* is the slope of the regression line for estimating the assessed species LD₅₀ from the test species LD₅₀ (EFED default value of 1.15). Adjusted LD₅₀s are calculated for small (20-gram), medium (100-gram), and large (1000-gram) birds. The test organism is a bobwhite quail with an average body weight of 0.178 kg (178 grams). For mammals using similar methodology to that employed for birds, the rat LD₅₀ and NOAEL of 709 mg/kg-bw and 7.3 mg/kg/day/bw, respectively, are adjusted for mammals of various sizes based on the following formula:

$$\text{Adj. LD}_{50} \text{ or NOAEL} = \text{LD}_{50} \text{ or NOAEL (TW/AW)}^{0.25}$$

LD₅₀, TW, and AW were previously defined. Adjusted LD₅₀s and NOAELs are calculated for small (15-gram), medium (35-gram), and large (1000-gram) mammals. The test organism is a rat with a reference body weight of 350 grams.

The resulting adjusted LD₅₀s and NOAEL are in **Table V-7** below.

Table V-7. Adjusted LD₅₀s for Birds and Mammals Based on an LD₅₀ of >2000 mg/kg-bw and 709 mg/kg-bw, respectively, and Adjusted NOAEL for Mammals Based on an NOAEL of 7.3 mg/kg/day/bw.				
Species	Class	Body Weight	Adjusted LD₅₀	Adjusted NOAEL
Avian	Small	20	>1441	Not adjusted
	Mid	100	>1534	Not adjusted
	Large	1000	>2591	Not adjusted
Mammal	Small	15	1558	16
	Mid	35	1261	13
	Large	100	545	5.6

a. Potential Risks to Birds via Broadcast Spray Applications to Foliar Surfaces

Acute RQs – Broadcast Spray Applications to Foliar Surfaces

Available acute toxicity data for birds suggest that flurprimidol is practically non-toxic to birds on acute oral and dietary bases. Study results indicate that the acute toxicity thresholds are greater than the highest concentrations tested (acute LD₅₀ >2000 mg ai/kg-bw and subacute dietary LC₅₀ >4310 mg ai/kg-diet). Since definitive acute toxicity thresholds were not established, acute avian RQs (dose- and dietary-based) were not estimated, and the potential risk and uncertainties to birds (surrogate for reptiles and terrestrial-phase amphibians) from spray applications to foliar surfaces are described qualitatively in the Risk Description section.

Chronic RQs – Broadcast Spray Applications to Foliar Surfaces

Available reproductive toxicity data for birds indicated that flurprimidol caused significant reductions of egg production, embryo survival, and hatchability as low as 642 mg ai/kg-diet, establishing the no-effect concentration at 309 mg ai/kg-diet. Assuming the maximum exposure scenario for broadcast spray applications to foliar surfaces at 0.75 lb ai/A applied four times with

2-week reapplication intervals, as well as the maximum predicted EECs; with an NOAEC of 309 mg ai/kg-diet, the chronic RQ is 1.6, which does exceed the LOC of 1.0 for birds consuming short grass only (Table V-8). However, assuming the lower scenario for broadcast spray applications to foliar surfaces at 0.26 lb ai/A applied twelve times with a 2-week reapplication interval, the highest RQ is 0.8 which does not exceed the chronic LOC for any of the assessed feed items.

The exceedance indicates avian species that consume short grass may be at risk for adverse effects to growth and reproduction from chronic exposure to flurprimidol as a result of broadcast spray application to foliar surfaces and will be discussed in the Risk Description section.

Table V-8 presents the chronic RQ calculations for birds exposed to flurprimidol via broadcast spray applications to foliar surfaces.

Table V-8. Upper Bound Kenaga, Chronic Avian Dietary-Based Risk Quotients for Broadcast Spray Applications to Foliar Surfaces									
Scenario	NOAEC (mg ai/kg-diet)	EECs and RQs							
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
4 apps at 0.75 lb ai/A with 2-week intervals	309	498	1.6*	228	0.7	280	0.9	31	0.1
12 apps at 0.26 lb ai/A with 2-week intervals		248	0.8	114	0.4	140	0.5	16	0.05

*Bolded entry indicates exceedance of the Chronic Risk and Endangered Species LOC (LOC >1)

b. Potential Risks to Birds via Banded Spray Applications to Ground Surfaces

Acute LD₅₀/ft² – Banded Spray Applications to Ground Surfaces

Available acute toxicity data for birds suggest that flurprimidol is practically non-toxic to birds on acute oral basis. Study results indicate that the acute toxicity thresholds are greater than the highest concentrations tested (acute LD₅₀s >2000 mg ai/kg-bw). Since definitive acute toxicity thresholds were not established, acute avian LD₅₀/ft²s were not estimated, and the potential risk and uncertainties to birds (surrogate for reptiles and terrestrial-phase amphibians) from banded spray applications to ground surfaces are described qualitatively in the Risk Description section.

c. Potential Risks to Mammals via Broadcast Spray Applications to Foliar Surfaces

Acute RQs – Broadcast Spray Applications to Foliar Surfaces

To evaluate acute risk to mammals, dose-based RQs are calculated using the rat LD₅₀ of 709 mg ai/kg-bw from the acute oral study with rats. Assuming the highest exposure scenario for

broadcast sprays to foliar surfaces (application rate at 0.75 lb ai/A applied three times with 2-week reapplication intervals), as well as the maximum predicted EECs for spray applications; the acute restricted use LOC of 0.2 and the endangered species LOC of 0.1 are exceeded for 15g and 35g mammals consuming short grass and the endangered species LOC is exceeded for 15g and 35g mammals consuming short grass, tall grass, and broadleaf plants and is also exceeded for 1000 g mammals consuming short grass. However, for the lower exposure scenario (12 applications of 0.26 lb ai/A with 2-week intervals), the endangered species LOC is narrowly exceeded for 15g and 35g mammals foraging on short grass. These exceedances indicate that herbivorous and insectivorous mammals of all weight classes may be at risk for adverse effects to survival from acute exposure to flurprimidol as a result of spray applications to foliar surfaces and will be discussed in the Risk Description section.

Dietary-based RQs are not estimated for mammals since acute dietary mammalian toxicity studies are not available.

Table V-9 presents the acute RQ calculations for mammals exposed to flurprimidol via broadcast spray applications to foliar surfaces.

Table V-9. Upper Bound Kenaga, Acute Mammalian Dose-Based Risk Quotients for Broadcast Spray Applications to Foliar Surfaces												
Scenario	Size Class (grams)	Adjusted LD50	EECs and RQs									
			Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivores	
			EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
4 apps x 0.75 lb ai/A with 2-wks interval	15	1558.26	474.94	0.30**	217.68	0.14*	267.16	0.17*	29.68	0.02	6.60	0.00
	35	1260.80	328.25	0.26**	150.45	0.12*	184.64	0.15*	20.52	0.02	4.56	0.00
	1000	545.33	76.11	0.14*	34.88	0.06	42.81	0.08	4.76	0.01	1.06	0.00
12 apps x 0.26 lb ai/A with 2-wks interval	15	1558.26	236.88	0.15*	108.57	0.07	133.24	0.09	14.80	0.01	3.29	0.00
	35	1260.80	163.71	0.13*	75.04	0.06	92.09	0.07	10.23	0.01	2.27	0.00
	1000	545.33	37.96	0.07	17.40	0.03	21.35	0.04	2.37	0.00	0.53	0.00

Bold entries indicate LOC exceedance (**exceeds the acute risk, restricted use, and endangered species LOCs; *exceeds the restricted use and endangered species LOCs; and *exceeds the endangered species LOC)

Chronic RQs – Broadcast Spray Applications to Foliar Surfaces

To evaluate the chronic risk to mammals, dose-based and dietary-based RQs for broadcast spray applications to foliar surfaces are calculated using the rat NOAEL of 7.3 mg ai/kg bw/day and NOAEC of 100 mg ai/kg-diet, respectively, from the two-generation study. Assuming maximum and minimum residue levels of the spray application scenarios, the dose-based RQs greatly exceed the chronic LOC of 1 for mammals. The chronic LOC is exceeded for herbivorous and insectivorous mammals of all weight classes consuming all grass, broadleaf plants, and small insects and exceeded for 15g and 35g mammals consuming fruits and large insects with maximum residues. Granivorous mammals were not affected when foraging on the assessed feed items with maximum and minimum flurprimidol residues.

The dietary-based RQs also exceeded the chronic LOC for mammal consuming all the assessed feed items except fruits/large insects.

These exceedances indicate that mammals may be at risk for adverse effects to reproduction and growth from acute and chronic exposure to flurprimidol as a result of broadcast spray applications to foliar surfaces and will be discussed in the Risk Description section.

Tables V-10 and V-11 present the chronic RQ calculations for mammals exposed to flurprimidol via broadcast spray applications to foliar surfaces.

Table V-10. Upper Bound Kenaga, Chronic Mammalian Dose-Based Risk Quotients for Broadcast Spray Applications to Foliar Surfaces

Scenario	Size Class (grams)	Adjusted NOAEL	EECs and RQs									
			Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivores	
			EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
4 apps x 0.75 lb ai/A with 2-wks interval	15	16.04	474.94	29.60	217.68	13.57	267.16	16.65	29.68	1.85	6.60	0.41
	35	12.98	328.25	25.29	150.45	11.59	184.64	14.22	20.52	1.58	4.56	0.35
	1000	5.61	76.11	13.55	34.88	6.21	42.81	7.62	4.76	0.85	1.06	0.19
12 apps x 0.26 lb ai/A with 2-wks interval	15	16.04	236.88	14.76	108.57	6.77	133.24	8.30	14.80	0.92	3.29	0.21
	35	12.98	163.71	12.61	75.04	5.78	92.09	7.09	10.23	0.79	2.27	0.18
	1000	5.61	37.96	6.76	17.40	3.10	21.35	3.80	2.37	0.42	0.53	0.09

*Bolded entries indicate exceedance of the Chronic Risk and Endangered Species LOC (LOC >1)

Table V-11. Upper Bound Kenaga, Chronic Mammalian Dietary Based Risk Quotients for Broadcast Spray Applications to Foliar Surfaces

Scenario	NOAEC (mg ai/kg-diet)	EECs and RQs							
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
4 apps x 0.75 lb ai/A with 2-wks interval	100	498.15	4.98	228.32	2.28	280.21	2.80	31.13	0.31
12 apps x 0.26 lb ai/A with 2-wks interval		248.45	2.48	113.87	1.14	139.75	1.40	15.53	0.16

¹ Size class not used for dietary risk quotients

*Bolded entries indicate exceedance of the Chronic Risk and Endangered Species LOC (LOC >1)

c. Potential Risks to Mammals via Banded Spray Applications to Ground Surfaces

Acute LD₅₀/ft² - Banded Spray Applications to Ground Surfaces

To evaluate acute risk to mammals, LD₅₀/ft²s are calculated using the rat LD₅₀ of 709 mg ai/kg-bw from the acute oral study with rats. Assuming the exposure scenario for "banded" sprays to ground surfaces at 0.69 lb ai/A (Table V-12) as well as the maximum predicted EECs; the acute

restricted use LOC of 0.2 and the endangered species LOC of 0.1 are exceeded for 15 g and 35 g mammals inhabiting those areas exposed to flurprimidol residues. These exceedances indicate that small- and medium-sized mammals may be at risk for adverse effects to survival from acute exposure to flurprimidol as a result of “banded” spray applications to ground surfaces and will be discussed in the Risk Description section.

Table V-12. Mammal LD50 per Square Foot for “Banded” Spray Applications to Ground Surfaces

Scenario	Size Class (grams)	Adjusted LD50	Broadcast ¹	
			mg/sq. ft	LD50/sq. ft
0.69 lb ai/A	15	1558	7.18	0.31**
	35	1261		0.16*
	1000	545		0.01

Bold entries indicate LOC exceedance (**exceeds the acute risk, restricted use, and endangered species LOCs; *exceeds the restricted use and endangered species LOCs; and *exceeds the endangered species LOC)

¹ T-REX does not have the capability to calculate EECs (mg/sq ft) based on “banded” applications occurring on the edge of a site; therefore, EECs are based on broadcast applications.

d. Potential Risks to Birds via Broadcast and Banded Granular Applications to Ground Surfaces

Acute LD₅₀/ft² - Broadcast and Banded Granular Applications to Ground Surfaces

Since definitive acute toxicity thresholds were not established, acute avian LD₅₀/ft² was not estimated, and the potential risk and uncertainties to birds (surrogate for reptiles and terrestrial-phase amphibians) from broadcast and banded granular applications to ground surfaces are described qualitatively in the Risk Description section.

e. Potential Risks to Mammals via Broadcast and Banded Granular Applications to Ground Surfaces

Acute LD₅₀/ft² - Broadcast and Banded Granular Applications to Ground Surfaces

Based on the available terrestrial ecotoxicity information and the predicted direct ingestion exposures (from the T-REX model); the acute LD₅₀/ft²s for all exposure scenarios (Tables V-13 and V-14) exceed the acute LOCs for 15 g and 35 g mammals. These exceedances indicate that small- and medium-sized mammals may be at risk for adverse effects to survival from acute exposure to flurprimidol as a result of granular applications to ground surfaces and will be discussed further in the Risk Description section.

Table V-13. Mammalian LD50 per Square Foot for Direct Ingestion of Broadcast Granular Applications on Ground Surfaces

Scenario	Size Class (grams)	Adjusted LD ₅₀	Broadcast	
			mg/sq. ft	LD ₅₀ /sq. ft
0.75 lb ai/A	15	1558.26	7.81	0.33**
	35	1260.80		0.18*

	1000	545.33		0.01
3.0 lb ai/A	15	1558.26	31.24	1.34***
	35	1260.80		0.71***
	1000	545.33		0.06

Bold entries indicate LOC exceedance (***exceeds the acute risk, restricted use, and endangered species LOCs; **exceeds the restricted use and endangered species LOCs; and *exceeds the endangered species LOC)

Table V-14. Mammalian LD50 per Square Foot for Direct Ingestion of "Banded" Granular Applications on Ground Surfaces

Scenario	Size Class (grams)	Adjusted LD ₅₀	Broadcast ¹	
			mg/sq. ft	LD ₅₀ /sq. ft
1.5 lb ai/A	15	1558.26	15.62	0.67***
	35	1260.80		0.35**
	1000	545.33		0.03

Bold entries indicate LOC exceedance (***exceeds the acute risk, restricted use, and endangered species LOCs; **exceeds the acute restricted use and endangered species LOCs)

¹ T-REX does not have the capability to calculate EECs (mg/sq ft) based on "banded" applications occurring on the edge of a site; therefore, EECs are based on broadcast applications.

2. Terrestrial-phase Amphibians and Reptiles

EFED currently uses surrogate data (birds) for terrestrial amphibians and reptiles. Risks to terrestrial amphibians and reptiles from spray and granular applications to both foliar and ground surfaces are qualitatively discussed in the Risk Description section.

3. Beneficial Insects

EFED does not quantify risk to terrestrial non-target insects; however, available toxicity data indicate flurprimidol is practically non-toxic to honeybees (LD₅₀ >100 µg ai/L). Potential risks to beneficial insects from spray and granular applications are qualitatively discussed in the Risk Description section.

4. Soil-dwelling Invertebrates (Earthworm)

Available acute toxicity data for earthworm suggest that flurprimidol is practically non-toxic to soil-dwelling invertebrates on acute basis. Study results indicate that the acute toxicity threshold is greater than the highest concentrations tested (acute LD₅₀ >100 mg ai/kg). Since definitive acute toxicity threshold was not established, the acute RQ was not estimated, and the potential risk to soil-dwelling invertebrates from spray and granular applications are described qualitatively in the Risk Description section.

C. Terrestrial Plants

For this baseline assessment with terrestrial plants, RQs are derived based on ecological toxicity data for the formulation end-use product, CUTLESS 50W containing 54.89% of the active

ingredient, and then compared to the EECs generated from the TerrPLANT model. RQs are calculated by comparing the toxicity values of the AI in the end-use product to TerrPLANT EECs generated based on spray and granular applications. Terrestrial EECs were derived for the use of flurprimidol based on the four scenarios developed for this baseline assessment. TerrPLANT does not have the capacity of generating EECs from banded applications and the risks to plants from banded applications will be evaluated based on broadcast applications. The potential risks to terrestrial plants are described further in the Risk Description section.

1. Non-Listed and Listed Terrestrial Plants

Terrestrial plant toxicity studies with monocots and dicots indicate that seedling emergence and vegetative vigor are impacted by exposure to flurprimidol. For the proposed new uses of flurprimidol and the maximum EECs of the use scenarios, the non-listed and listed plant LOCs were all exceeded for dicots inhabiting dry and semi-aquatic areas adjacent to treated areas as a result of runoff from broadcast spray and granular applications. In addition, the listed plant LOC was exceeded for dicots inhabiting areas adjacent to treated areas as a result of spray drift from one broadcast spray application at 0.75 lb ai/A (Table V-15).

For monocots, the LOCs were not exceeded for all use scenarios as a result of spray drift; however, for some of the use scenarios especially for those that inhabit in semi-aquatic areas, the non-listed and listed LOCs were all exceeded as a result of runoff.

The results indicate that monocots and dicots inhabiting terrestrial and semi-aquatic areas would be at risk for adverse effects to growth and development when exposed to flurprimidol as a result of the spray and granular application of flurprimidol to the proposed new uses.

Table V-15. Terrestrial Plant Risk Quotient Summary for Flurprimidol^{1,2,3}

Scenario	Non-listed RQs			Listed RQs		
	Terrestrial Adjacent area	Semi-aquatic Adjacent area	Drift	Terrestrial Adjacent area	Semi-aquatic Adjacent area	Drift
Broadcast Spray (1 application at 0.26 lb ai/A)						
<i>Ground</i>						
Monocot	0.11	0.95	<0.1	0.41	3.49	<0.1
Dicot	1.3	11.05	0.24	3.55	30.14	0.57
Broadcast Spray (1 application at 0.75 lb ai/A)						
<i>Ground</i>						
Monocot	0.32	2.73	<0.1	1.18	10.07	0.2
Dicot	3.75	31.88	0.68	10.23	86.93	1.63
Broadcast Granular Application (1 application at 0.75 lb ai/A)						
<i>Ground</i>						
Monocot	0.27	2.68	<0.1	0.99	9.87	<0.1
Dicot	3.13	31.25	<0.1	8.52	85.23	<0.1
Broadcast Granular Application (1 application at 3.0 lb ai/A)						
<i>Ground</i>						
Monocot	1.07	10.71	<0.1	3.95	39.47	<0.1
Dicot	12.5	125	<0.1	34.09	340.91	<0.1

¹Detailed calculations for RQs and TerrPlant Ver. 1.2.2 input and output are provided in Appendix E.

²Non-listed toxicity thresholds (EC₂₅) were 0.14 lb ai/A, 0.012 lb ai/A, 0.42 lb ai/A, and 0.011 lb ai/A for seedling emergence monocot, seedling emergence dicot, vegetative vigor monocot, and vegetative vigor dicot, respectively.

³Listed toxicity thresholds (NOAEC) were 0.038 lb ai/A, 0.0044, 0.11, 0.0046 lb ai/A for seedling emergence monocot, seedling emergence dicot, vegetative vigor dicot And vegetative vigor monocot, respectively.

VI. RISK DESCRIPTION

The risk hypothesis states that the use of flurprimidol as a plant growth regulator has the potential to compromise survivorship, reproduction, and/or growth of non-target aquatic and terrestrial animals and plants, including Federally-listed endangered and threatened species. Based on the available ecotoxicity data and predicted environmental exposures, this ecological risk assessment supports the presumption of acute and chronic risks to mammals foraging the assessed feed items with flurprimidol residues and the risk from ingestion of granules. In addition, risk is presumed for terrestrial dicots and monocots and aquatic vascular plants inhabiting areas adjacent to the treated areas exposed to flurprimidol as a result of runoff and spray drift. In contrast, the presumption of acute and chronic risks to birds, terrestrial-phase amphibians, reptiles, insects, soil-dwelling invertebrates, fish, aquatic invertebrates, and aquatic non-vascular plants (green algae) are not supported by the results of this baseline risk assessment.

A. Risks to Non-target Aquatic Animals and Plants

In the conceptual model, spray drift and surface runoff/leaching to adjacent bodies of water were predicted as the most likely sources of exposure of flurprimidol to non-target aquatic animals and plants. Risks to aquatic organisms and plants were assessed based on modeled estimated environmental concentrations (EECs) and available toxicity data. Aquatic EECs for the

ecological exposure to flurprimidol were estimated using GENEEC2 (Table III-3) and PRZM/EXAMS (Table III-5).

1. Aquatic Organisms

There are no acute or chronic LOC exceedances for fish and invertebrates based on the most conservative aquatic exposure scenario among a suite of use scenarios assessed; thus, fish and invertebrates, including Federally-listed endangered and threatened species, there are no indication of adverse effects to survival, reproduction, and/or growth for fish and invertebrates from acute and chronic exposure to flurprimidol as a result of the labeled uses.

2. Aquatic-phase Amphibians

EFED currently uses surrogate data (freshwater fish) for non-target aquatic-phase amphibians. There were no LOC exceedances for acute or chronic risk to freshwater fish; thus, there is no indication of adverse effects to survival, reproduction, and/or growth for aquatic-phase amphibians from exposure to flurprimidol as a result of the labeled uses.

3. Aquatic Plants

There is only one aquatic non-vascular plant study out of four aquatic non-vascular plant studies available for flurprimidol; the green algae study indicates that flurprimidol affects biomass. The aquatic vascular plant study with duckweed indicates that flurprimidol affects all endpoints with frond density the most affected. Based on the use scenarios assessed and the available toxicity information, the non-listed and listed plant LOCs (LOC >1) were exceeded for duckweed (RQs range from 1.4 to 16) but not exceeded for green algae (RQs range from 0.14 to 0.49; Table VI-1). There is some uncertainty regarding the potential risk specifically to aquatic vascular plants because flurprimidol regulates plant growth without killing the plants as seen in the toxicity studies with duckweed and green algae. Thus, it is possible that flurprimidol is not lethal to aquatic plants. It is uncertain of the impact on endangered and threatened aquatic vascular plants inhabiting water bodies adjacent to treated areas when exposed to flurprimidol as a result of spray drift and runoff. However, when those non-target plants come into contact with flurprimidol, it is anticipated that reduced growth or a delay in growth will be observed, but it is uncertain how flurprimidol will affect one's ability to survive, grow, and reproduce.

B. Risks to Non-target Terrestrial Animals and Plants

In the conceptual model, ground deposition of liquid and granular formulations, spray drift, and wind erosion of soil particles with resulting residues on foliage and on flowers and seeds, including granules on the ground are the most likely sources of flurprimidol exposure to non-target terrestrial animals, including listed species. Risks to terrestrial animals and plants were assessed based on modeled EECs and available toxicity data. As part of the terrestrial assessment, exposure concentrations of flurprimidol to non-target terrestrial plants and animals were modeled according to the labeled application rates for ornamentals and turfgrasses. For terrestrial birds and mammals, estimates of upper-bound levels of flurprimidol residues on various food items and granules, which may be contacted or consumed by wildlife, were

determined using the Fletcher nomogram followed by a first order decline model TREX 1.4.1. Risk to soil-dwelling invertebrates was determined by estimating the amount of flurprimidol residues in soil. Likewise, the TerrPlant 1.2.2 model was used to estimate exposure to non-target plants.

1. Birds

a. Potential Acute Risks from Broadcast and Banded Spray Applications to Foliar and Ground Surfaces and Direct Ingestion of Granules

Since definitive acute oral and dietary toxicity thresholds were not established in the submitted studies, acute avian RQs were not estimated for birds (surrogate for reptiles and terrestrial-phase amphibians). Flurprimidol is categorized as practically non-toxic on an oral and dietary basis to two avian species (acute LD₅₀ >2000 mg ai/kg-bw; >4310 mg ai/kg-diet).

Because acute avian RQs were not estimated due to non-definitive acute toxicity thresholds, to be certain the “greater than” concentrations were tested high enough in the acute avian studies to be protective of non-listed and listed species, these acute values for birds were compared with an exposure value to determine if the EEC is greater than 1/10th or ½ of the highest concentrations tested. The highest T-REX dose-based EEC for birds is 567 mg/kg bw for short grass consumed by a 20 g bird selected from the maximum exposure scenario following four spray applications at 0.75 lb ai/A with a 14-day interval. A comparison of the adjusted LD₅₀ for 20 g birds of >1440 mg ai/kg-bw with the T-REX dose-based EEC (567 mg/kg) indicates a 2.5-fold difference between the highest EEC and the concentrations which produced a lethal effect on 50% of the birds species. For that reason, there is an uncertainty for listed bird species (the LOC for listed bird species is 0.1) because the dose-based EEC is greater than 1/10th of the highest dose tested in the studies. Also, a comparison of the dietary LC₅₀ with the highest dietary-based EEC indicates a 8.5-fold difference and because the dietary-based EEC is greater than 1/10th of the highest dose tested, the uncertainty for listed birds also exists on a dietary basis. None of the dose- or dietary-based EECs was greater than half of the highest doses tested; thus, there are no concerns for non-listed bird species (the LOC for non-listed bird species is 0.5).

With an uncertainty for listed bird species, risk is expected to be minimal for birds foraging any of the selected food items, earthworms, or granules with flurprimidol residues; avian species are likely not at risk for adverse effects to survival from acute oral or dietary exposures to flurprimidol as a result of the labeled uses.

b. Potential Chronic Risks from Broadcast and Banded Spray Applications to Foliar and Ground Surfaces.

For broadcast spray applications to foliar surfaces using the maximum (four applications at 0.75 lb ai/A with a two-week reapplication interval) and minimum (twelve applications at 0.26 lb ai/A with a two-week reapplication interval) exposure scenarios with upper bound EECs and an NOAEC of 309 mg ai/kg-diet, the chronic LOC is exceeded only when the maximum scenario is assumed. With four broadcast spray applications at 0.75 lb ai/A, the RQ of 1.6 for birds feeding on short grass exceeds the chronic LOC of 1. However, there are no LOC exceedances for birds

feeding on the other assessed feed items for the maximum scenario and for birds feeding on all the assessed feed items when the minimum exposure scenario is assumed. Although there is an exceedance of the chronic LOC based on the maximum exposure scenario, the potential risk for adverse effects to growth and reproduction is based on the assumption that birds occupy the area permanently and are feeding on short grass exclusively within the treated areas where turfgrasses are grown. To the extent that those birds do not reside permanently within the treated area, exposure will be less and risk is presumably less. In addition, there are no LOC exceedances for both scenarios when the mean EECs are assumed.

Chronic risks to birds from banded spray applications to ground surfaces are not estimated due to model limitations; given that banded sprays are applied along the perimeter of lawns, landscape beds, sidewalks, curbs, parking lots, driveways, posts, mailboxes, building structures, and other similar areas where turfgrasses are grown rather than on an one-acre field as T-REX assumes; exposure to birds from banded applications will be lower than broadcast applications; thus, risk will be presumably less but not ruled out since the LOC was exceeded for broadcast applications.

c. Potential Chronic Risks from Direct Ingestion of Granules

EFED has no standard methodology for assessing chronic risk to birds from granular applications. The following chronic exposure estimation and risk characterization for birds considers granular routes of exposure including direct ingestion of soil invertebrates that have bioconcentrated pesticide residues of granules in soil; thus, EFED has taken further steps to characterize the potential for chronic risk to avian species exposed to flurprimidol granules. Based on the highest EEC of flurprimidol in earthworm tissue (35 µg a.i./kg) and lowest avian NOAEC of 309 mg a.i./kg-diet, the chronic LOC is not exceeded (Table VI-2) and is 8800x lower than the modeled EEC for insectivorous birds exposed to flurprimidol granules via ingestion of earthworms at the maximum application rate of 3.0 lb a.i./A (see Appendix D). For birds, direct consumption of granules and dose-based risk quotients for direct consumption of earthworm are not calculated for the chronic risk estimation, the risks are unknown.

Table VI-2. Dietary-based Chronic RQ for Insectivorous Birds				
Application Rate	Body Weight (g)	Earthworm EEC (mg/kg-earthworm)	NOAEC (mg a.i./kg)	Chronic RQ ^a
3.0 lb a.i./A	All	0.035	309	<0.1

^a Chronic RQ = Earthworm EEC / NOAEC.

2. Terrestrial-phase Amphibians and Reptiles

a. Potential Acute Risks from Broadcast and Banded Spray Applications to Foliar and Ground Surfaces and Direct Ingestion of Granules

EFED currently uses data on surrogate species (birds) to assess non-target terrestrial-phase amphibians and reptiles. Based on the evaluation of potential acute risks to birds, potential acute risks to reptiles and terrestrial-phase amphibians are also lower than the Agency's listed species level of concern. Thus, reptiles and terrestrial-phase amphibians would not be at risk for adverse

effects on survival from granular or foliar consumption. However, the evaluation also indicates there is an uncertainty for listed reptiles and amphibians because the upper bound EECs were higher than $1/10^{\text{th}}$ of the highest doses tested in the acute oral and dietary studies with birds.

b. Potential Chronic Risks from Broadcast Spray Applications to Foliar and Ground Surfaces.

Based on the evaluation of potential chronic risks to birds from foliar sprays, potential chronic risks to reptiles and terrestrial-phase amphibians are also higher than the Agency's listed species level of concern. Thus, reptiles and terrestrial-phase amphibians would be at risk for adverse effects on reproduction and growth from foliar consumption. Similar to birds, exposure to reptiles and terrestrial-phase amphibians from banded applications to ground surfaces will be lower than broadcast applications; thus, risk will be presumably less but not ruled out.

c. Potential Chronic Risks from Direct Ingestion of Granules

Based on the evaluation of potential chronic risks to birds from ingestion of soil invertebrates as one of the granular routes, potential chronic risks to reptiles and terrestrial-phase amphibians are also lower than the Agency's listed species level of concern. Thus, reptiles and terrestrial-phase amphibians would not be at risk for adverse effects on reproduction and growth from indirect granule (soil invertebrate) consumption with flurprimidol residues. However, the chronic risk from direct granule consumption is unknown.

3. Mammals

a. Potential Acute Risks from Broadcast Spray Applications to Foliar Surfaces

Acute RQs – Broadcast Spray Applications to Foliar Surfaces (Reg. No. 67690-15, Cutless 50W Turf Growth Regulator)

Based on the maximum exposure scenario (four broadcast spray applications of 0.75 lb ai/A with a reapplication interval of 2 week) using Cutless 50W Turf Growth Regulator (Reg. No. 67690-15) and maximum predicted EECs, the acute mammalian dose-based risk quotients for broadcast spray applications to foliar surfaces exceed the acute restricted use and endangered species LOCs for 15 g and 35 g mammals consuming short grass and the endangered species LOC is exceeded for 1000 g mammals consuming short grass and for 15 g and 35 g mammals consuming tall grass, broadleaves and small insects. In addition, there is an exceedance of the endangered species LOC for 15g mammals consuming short grass when mean predicted EECs are assumed.

A closer look of the terrestrial assessment indicates that for 15 g mammals feeding on short grass, the endangered species LOC is exceeded if flurprimidol is applied at least once and for 35 g mammals feeding on short grass, it requires two or more applications to exceed the LOC. It requires three or more applications for potential risk to 1000 g mammals feeding on short grass with residues of the active ingredient.

For the lower (minimum) exposure scenario (12 broadcast spray applications of 0.26 lb ai/A with a reapplication interval of 2 week) and maximum predicted EECs, the endangered species LOC

is exceeded for 15g and 35g mammals consuming short grass. However, there are no LOC exceedances with mean predicted EECs.

b. Potential Acute Risks from Banded Spray Applications to Ground Surfaces

Acute LD_{50}/ft^2 – Banded Spray Applications to Ground Surfaces (Reg. No. 67690-46, SP5075 Turf Growth Regulator)

Based on the maximum exposure scenario for banded spray applications to ground surfaces using the SP5075 Turf Growth Regulator product and intermediate EECs, the acute mammalian LD_{50}/ft^2 exceed the acute restricted use and endangered species LOCs for 15 g mammals while the endangered species LOC is exceeded for 35 g mammals inhabiting the treated areas where flurprimidol is applied to the ground. The RQs ranged from 0.01 to 0.31 for a banded spray application to ground surface at 0.69 lb a.i./A, respectively, with small-sized mammals affected the most when exposed.

c. Potential Acute Risks from Direct Ingestion of Granules

Acute LD_{50}/ft^2 – Broadcast Granular Applications to Ground Surfaces (Reg. No. 67690-19, Turf Fertilizer – Contains Cutless 0.5% and Reg. No. 67690-13, Cutless 0.33G Landscape Growth Regulator)

Based on one broadcast application of granules at 3.0 lb a.i./A using either the turf fertilizer (Reg. No. 67690-19) or landscape regulator (Reg. No. 67690-13) product and intermediate EECs, the acute risk, restricted use, and endangered species LOCs are exceeded for 15 g and 35 g mammals inhabiting the treated areas. However, for broadcast applications of granules to ground surfaces at 0.75 lb a.i./A and 3-week intervals, the restricted use and endangered species LOCs are exceeded for 15 g mammals and the endangered species LOC is exceeded for 35 g mammals.

Acute LD_{50}/ft^2 – Banded Granular Applications to Ground Surfaces (Reg. No. 67690-44, Turf Fertilizer – Contains Cutless 0.17% and Reg. No. 67690-13, Cutless 0.33G Landscape Growth Regulator)

Based on banded applications of granules at 1.5 lb a.i./A and 8-week intervals using either the turf fertilizer (Reg. No. 67690-44) or landscape regulator (Reg. No. 67690-13) product and intermediate EECs, the RQ of 0.67 for 15 g mammals exceed the acute risk, restricted use, and endangered species LOCs, the RQ of 0.35 for 35 g mammals exceed the acute restricted use and endangered species LOCs, and the RQ of 0.03 for 1000 g mammals does not exceed any of the LOCs.

d. Number of Granules Needed to be Consumed by a Mammal to Achieve Toxicity Thresholds

To better characterize the risks to mammals, this baseline risk assessment also estimates the minimum foraging area (square feet) needed to allow for direct ingestion of sufficient mass of flurprimidol granules to achieve a dose that exceeds the adjusted LD_{50} by assuming that a mammal consumes 100%, 50% or 10% of the available granules depending on mammal's weight

class. In order to derive a first approximation of acute exposure and risk to granular flurprimidol for mammals that may directly consume granules, the TREX model takes into account that 100% of mammal's diet is comprised of granules. Therefore, EFED has taken further steps to characterize the potential for acute risk to mammalian species by evaluating how much area would need to be foraged to achieve the amount of flurprimidol granules necessary to trigger the Agency's Levels of Concern (LOCs). Tables VI-3, VI-4, and VI-5 calculate the number of granules and minimum foraging area needed to exceed Agency's LOCs at 0.75 lb a.i./A, 1.5 lb a.i./A, and 3.0 lb a.i./A granular flurprimidol.

Table VI-3. Estimates of the number of granules, and minimum area foraged needed for a 15g, 35g, and 1000g mammal to achieve the EEC that would trigger an exceedance of the adjusted LD50, acute risk LOC (0.5), and endangered species risk (0.5) levels of concern (LOCs) based on an application rate of 0.75 lb a.i./A				
		Mammal Size (grams)		
		15	35	1000
No. of Consumed Granules Required to Reach the Specified LOC	Adjusted LD ₅₀	24	44	545
	Acute Risk LOC (0.5)	12	22	273
	Endangered Species LOC (0.1)	3	5	55
Area of Field to be Foraged (square feet) to Achieve the Endangered Species LOC Based on Application Rate of 0.75 lb/A.*	Assuming a 100% Feeding Efficiency	0.3	0.6	7
	Assuming a 50% Feeding Efficiency	0.6	1	14
	Assuming a 10% Feeding Efficiency	3.0	6	70

* Immediate EEC = 7.81 mg/square feet (excluding row spacing, bandwidth, and # of rows input parameters)

In Table VI-3 above, it was estimated that it would take a 15g mammal to consume 3 granules that would result in an exceedance of the endangered species LOC. Based on the application rate of 0.75 lb/A, this number of granules could be gleaned from 0.3, 0.6, or 3 square feet (within the treated band) when assuming a 100%, 50%, or 10% feeding efficiency, respectively. To achieve an EEC equivalent dose that would result in an exceedance of the endangered species LOC, a 1000g mammal would have to consume 55 granules. It was estimated that this number of granules could be consumed in an area of 7, 14, or 70 square feet when assuming a 100%, 50%, or 10% feeding efficiency, respectively.

Table VI-4 calculates the number of granules and minimum foraging area needed to exceed Agency's LOCs at the minimum application rate of 1.5 lb/A granular flurprimidol.

Table VI-4. Estimates of the number of granules, and minimum area foraged needed for a 15g, 35g, and 1000g mammal to achieve the EEC that would trigger an exceedance of the adjusted LD50, acute risk LOC (0.5), and endangered species risk (0.5) levels of concern (LOCs) based on an application rate of 1.5 lb/A				
		Mammal Size (grams)		
		15	35	1000
No. of Consumed Granules Required to Reach the Specified LOC	Adjusted LD ₅₀	24	44	545
	Acute Risk LOC (0.5)	12	22	273
	Endangered Species LOC (0.1)	3	5	55
Area of Field to be Foraged (square feet) to Achieve the Endangered Species LOC Based	Assuming a 100% Feeding Efficiency	0.15	0.28	4

on Application Rate of 1.5 lb/A.*	Assuming a 50% Feeding Efficiency	0.3	0.57	7
	Assuming a 10% Feeding Efficiency	1.5	2.83	35

* Immediate EEC = 15.62 mg/square feet (excluding row spacing, bandwidth, and # of rows input parameters)

In **Table VI-4** above, it was estimated that it would take a 15g mammal to consume 3 granules that would result in an exceedance of the endangered species LOC. Based on the application rate of 1.5 lb/A, this number of granules could be gleaned from 0.15, 0.3, or 1.5 square feet (within the treated band) when assuming a 100%, 50%, or 10% feeding efficiency, respectively. To achieve an EEC equivalent dose that would result in an exceedance of the endangered species LOC, a 1000g mammal would have to consume 55 granules. It was estimated that this number of granules could be consumed in an area of 4, 7, or 35 square feet when assuming a 100%, 50%, or 10% feeding efficiency, respectively.

Table VI-5 calculates the number of granules and minimum foraging area needed to exceed Agency's LOCs at the minimum application rate of 3.0 lb/A granular flurprimidol.

Table VI-5. Estimates of the number of granules, and minimum area foraged needed for a 15g, 35g, and 1000g mammal to achieve the EEC that would trigger an exceedance of the adjusted LD50, acute risk LOC (0.5), and endangered species risk (0.5) levels of concern (LOCs) based on an application rate of 3.0 lb/A					
		Mammal Size (grams)			
		15	35	1000	
No. of Consumed Granules Required to Reach the Specified LOC	Adjusted LD ₅₀	24	44	545	
	Acute Risk LOC (0.5)	12	22	273	
	Endangered Species LOC (0.1)	3	5	55	
Area of Field to be Foraged (square feet) to Achieve the Endangered Species LOC Based on Application Rate of 3.0 lb/A.*	Assuming a 100% Feeding Efficiency	0.07	0.14	1.75	
	Assuming a 50% Feeding Efficiency	0.15	0.28	3.5	
	Assuming a 10% Feeding Efficiency	0.75	1.4	17.5	

* Immediate EEC = 31.24 mg/square feet (excluding row spacing, bandwidth, and # of rows input parameters)

In **Table VI-5** above, it was estimated that it would take a 15g mammal to consume 3 granules that would result in an exceedance of the endangered species LOC. Based on the application rate of 3.0 lb/A, this number of granules could be gleaned from 0.07, 0.15, or 0.75 square feet (within the treated band) when assuming a 100%, 50%, or 10% feeding efficiency, respectively. To achieve an EEC equivalent dose that would result in an exceedance of the endangered species LOC, a 1000g mammal would have to consume 55 granules. It was estimated that this number of granules could be consumed in an area of 1.75, 3.5, or 17.5 square feet when assuming a 100%, 50%, or 10% feeding efficiency, respectively.

e. Potential Chronic Risks from Broadcast Spray Applications to Foliar Surfaces

Chronic RQs – Broadcast Spray Applications to Foliar Surfaces (Reg. No. 67690-15, Cutless 50W Turf Growth Regulator)

Based on the maximum exposure scenario (four broadcast spray applications of 0.75 lb ai/A with a reapplication interval of 2 week) using Cutless 50W Turf Growth Regulator (Reg. No. 67690-15) and maximum predicted EECs, the chronic mammalian dose-based risk quotients for broadcast spray applications to foliar surfaces exceed the Chronic LOC for mammals of all weight classes consuming all the assessed feed items except for 1000 g mammals consuming fruits, seeds, and large insects. In addition, there is an exceedance of the Chronic LOC for mammals of all weight classes consuming all assessed feed items except fruits, seeds, and large insects when mean predicted EECs are assumed.

A closer look of the terrestrial assessment indicates that for 15 g, 35 g, and 1000 g mammals feeding on any of the assessed feed items except fruits, seeds, and large insects, the chronic LOC is exceeded after one application of flurprimidol.

For the lower (minimum) exposure scenario (12 broadcast spray applications of 0.26 lb ai/A with a reapplication interval of 2 week) and maximum predicted EECs, the Chronic LOC is exceeded for mammals of all weight classes consuming all the assessed feed items except for fruits, seeds, and large insects. However, the mean predicted EECs did not remove the LOC exceedances for mammals of all weight classes consuming short grass, tall grass, broadleaves, and small insects.

f. Potential Chronic Risks from Banded Spray Applications to Ground Surfaces

Chronic LD₅₀/ft² – Banded Spray Applications to Ground Surfaces (Reg. No. 67690-46, SP5075 Turf Growth Regulator)

Chronic risks to mammals from banded spray applications to ground surfaces are not estimated due to model limitations; given that banded sprays are applied along the perimeter of lawns, landscape beds, sidewalks, curbs, parking lots, driveways, posts, mailboxes, building structures, and other similar areas where turfgrasses are grown rather than on an one-acre field as T-REX assumes; exposure to mammals from banded applications will be lower than broadcast applications; thus, risk will be presumably less but not ruled out since the RQs were high for broadcast applications.

g. Potential Chronic Risks from Direct Ingestion of Granules

Similar to birds, EFED has no standard methodology for assessing chronic risk to mammals from granular applications. The following chronic exposure estimation and risk characterization for mammals considers granular routes of exposure including direct ingestion of soil invertebrates that have bioconcentrated pesticide residues of granules in soil; thus, EFED has taken further steps to characterize the potential for chronic risk to mammalian species exposed to flurprimidol granules. Based on the highest EEC of flurprimidol in earthworm tissue (35 µg a.i./kg) and lowest mammalian NOAEC of 100 mg a.i./kg-diet, the chronic LOC is not exceeded (**Table VI-6**) and is 2860x lower than the modeled EEC for insectivorous mammals exposed to flurprimidol granules via ingestion of earthworms at the maximum application rate of 3.0 lb a.i./A (see **Appendix D**). Similar to birds, direct consumption of granules and dose-based risk quotients for direct consumption of earthworm are not calculated for the chronic risk estimation, the risks are unknown.

Table VI-6. Dietary-based Chronic RQ for Insectivorous Mammals				
Application Rate	Body Weight (g)	Earthworm EEC (mg/kg-earthworm)	NOAEC (mg a.i./kg)	Chronic RQ^a
3.0 lb a.i./A	All	0.035	100	<0.1

^a Chronic RQ = Earthworm EEC / NOAEC.

4. Soil-Dwelling Invertebrates

Since a definitive acute toxicity threshold was not established in the submitted earthworm study, acute soil invertebrates RQs were not estimated for earthworm. Flurprimidol is categorized as practically non-toxic on an acute basis to earthworms (acute LD₅₀ >100 mg ai/kg). Risk is expected to be minimal for soil-dwelling invertebrates burrowing soils with flurprimidol residues; soil-dwelling invertebrate species are not at risk for adverse effects to survival from acute exposure to flurprimidol as a result of the labeled uses.

5. Beneficial Insects

The available terrestrial insect toxicity data, based on tests with honeybees, suggest that flurprimidol is practically non-toxic to bees on an acute contact basis. The LD₅₀ value was >100 µg ai/bee. Risk to beneficial insects in the direct treatment area exposed to the AI is expected to be minimal; consequently, precautionary labeling for honeybee protections is not required at this time.

6. Terrestrial Plants

Based on the use scenarios assessed and the available toxicity information, the non-listed and listed plant LOCs (LOC >1) were exceeded for terrestrial plants exposed to flurprimidol (Table V-16), depending on which label is used. For instance, spray drift is not a concern for flurprimidol except when a 0.75 lb a.i./A foliar spray is applied. The listed plant LOC was exceeded for all use scenarios with the exception of monocots in dry areas based on one broadcast foliar application at 0.26 lb ai/A and one broadcast application of granules at 0.75 lb ai/A. There is some uncertainty regarding the potential risk to terrestrial plants because flurprimidol regulates plant growth without killing the plants as seen in the seedling emergence and vegetative vigor toxicity studies with monocots and dicots. Thus, it is possible that flurprimidol is not lethal to terrestrial plants. It is uncertain of the impact on endangered and threatened plants inhabiting areas adjacent to treated areas when exposed to flurprimidol as a result of spray drift and runoff. However, when those plants come in contact with flurprimidol, it is anticipated that reduced growth or a delay in growth will be observed, but it is uncertain how flurprimidol will affect one's ability to survive, grow, and reproduce.

C. Review of Incident Data

A search of the EIIS (Environmental Incident Information System) database for ecological incidents (searched on April 5, 2010) reported no adverse ecological incidents.

D. Endocrine Disruptor Screening Program

As required under FFDCA section 408(p), EPA has developed the Endocrine Disruptor Screening Program (EDSP) to determine whether certain substances (including pesticide active and other ingredients) may have an effect in humans or wildlife similar to an effect produced by a “naturally occurring estrogen, or other such endocrine effects as the Administrator may designate.” The EDSP employs a two-tiered approach to making the statutorily required determinations. Tier 1 consists of a battery of 11 screening assays to identify the potential of a chemical substance to interact with the estrogen, androgen, or thyroid (E, A, or T) hormonal systems. Chemicals that go through Tier 1 screening and are found to have the potential to interact with E, A, or T hormonal systems will proceed to the next stage of the EDSP where EPA will determine which, if any, of the Tier 2 tests are necessary based on the available data. Tier 2 testing is designed to identify any adverse endocrine related effects caused by the substance, and establish a dose-response relationship between the dose and the E, A, or T effect.

Between October 2009 and February 2010, EPA is issuing test orders/data call-ins for the first group of 67 chemicals, which contains 58 pesticide active ingredients and 9 inert ingredients. This list of chemicals was selected based on the potential for human exposure through pathways such as food and water, residential activity, and certain post-application agricultural scenarios. This list should not be construed as a list of known or likely endocrine disruptors.

Flurprimidol is not among the group of 58 pesticide active ingredients on the initial list to be screened under the EDSP. Under FFDCA sec. 408(p) the Agency must screen all pesticide chemicals. Accordingly, EPA anticipates issuing future EDSP test orders/data call-ins for all pesticide active ingredients.

For further information on the status of the EDSP, the policies and procedures, the list of 67 chemicals, the test guidelines and the Tier 1 screening battery, please visit our website: <http://www.epa.gov/endo/>.

E. Federally Threatened and Endangered (Listed) Species Concerns

Section 7 of the Endangered Species Act, 16 U.S.C. Section 1536(a)(2), requires all federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in destruction or adverse modification of designated critical habitat. To jeopardize the continued existence of a listed species means “to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of the species” (50 CFR 402.02).

To facilitate compliance with the requirements of the Endangered Species Act (subsection (a)(2)), the Office of Pesticide Programs has established procedures to evaluate whether a proposed registration action may direct or indirectly appreciably reduce the likelihood of both the survival and recovery of a listed species (USEPA, 2004.). After the Agency’s baseline risk assessment is conducted, if any of the Agency’s listed species LOCs are exceeded for either

direct or indirect effects, an analysis is conducted to determine if any listed or candidate species could be contaminated from runoff/erosion or direct ingestion of granules. If listed or candidate species may be present in the proposed action area, further biological assessment is undertaken. The extent to which listed species may be at risk is considered, which then determined the need for development of a more comprehensive consultation package, as required by the Endangered Species Act.

The federal action addressed herein is the proposed registration for nationwide use of flurprimidol on turf grass and ornamentals. According to the USDA National Agricultural Statistics Service (NASS) 2002 census, the proposed uses are likely to found everywhere in the States, especially golf courses and athletic fields.

1. Action Area

For listed species assessment purposes, the action area is considered to be the area affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. At the initial baseline, the risk assessment considers broadly described taxonomic groups and so conservatively assumes that listed species within those broad groups are co-located with the pesticide treatment area. This means that terrestrial plants and wildlife are assumed to be located on or adjacent to the treated site and aquatic animals and plants are assumed to be located in a surface water body adjacent to the treated site. The assessment also assumes that the listed species are located within an assumed area that has the relatively highest potential exposure to the pesticide, and that exposures are likely to decrease with distance from the treatment area.

At this time EFED cannot make a "no effect" or "may effect" determination if the assumptions associated with the baseline action area result in RQs that are below or above the listed species LOCs since the Service(s) has not identified which listed species and critical habitat are potentially implicated. Furthermore, if RQs are below the listed species LOCs for a given taxonomic group, this may indicate a "no concern" for indirect effects upon listed species that depend upon the taxonomic group covered by the RQ as a resource. However, in situations where the baseline assumptions lead to RQs in excess of the listed species LOCs for a given taxonomic group, a potential for a "may affect" conclusion could exist and may be associated with direct effects on listed species belonging to that taxonomic group or may extend to indirect effects upon listed species that depend upon that taxonomic group as a resource. In such cases, additional information on the biology of listed species, the locations of these species, and the locations of use sites could be considered along with available information on the fate and transport properties of the pesticide to determine the extent to which baseline assumptions regarding an action area apply to a particular listed animal. These subsequent refinement steps could consider how this information would impact the action area for a particular listed animal and may potentially include areas of exposure that are downwind and downstream of the pesticide use site.

2. Taxonomic Groups Potentially at Risk

The baseline risk assessment for listed species indicates these following taxonomic groups are potentially at risk when exposed to flurprimidol (Table I-1).

- Chronic risk to birds from foraging on short grass with flurprimidol residues following four broadcast sprays of 0.75 lb a.i./A with a two-week reapplication interval;
- Acute and chronic risks to mammals from foraging on assessed feed items following any of the broadcast and banded spray applications;
- Acute risk to 15 g and 35 g mammals from ingestion of granules following any of the broadcast and banded granular applications;
- Risks to seedling emergence and vegetative vigor of monocots and dicots when exposed to flurprimidol as a result of runoff and spray drift following any application; and
- Risks to aquatic vascular plants when exposed to flurprimidol as a result of runoff and spray drift following any application.

a. Discussion of Risk Quotients

The Agency's LOC for endangered birds (surrogate for terrestrial-phase amphibians and reptiles), mammals, and terrestrial and aquatic vascular plants is exceeded for the use of flurprimidol as outlined in previous sections. Should estimated exposure levels occur in proximity to listed resources, the available baseline information may suggest a potential concern for direct effects on listed species within these taxonomic groups listed above associated with the currently supported uses of flurprimidol.

3. Indirect Effects Analysis

Modeled exposures for the following taxonomic groups indicate LOC exceedances for birds and mammals; consequently, there is a potential for indirect effects to listed species dependent upon birds and mammals for food, pollination or seed dispersal, or using burrows or cover requirements for shelter and breeding habitat. In addition, since birds serve as the surrogate for terrestrial-phase amphibians and reptiles, there is concern for potential indirect effects to listed species dependent on listed terrestrial-phase amphibians and reptiles.

In addition, the listed plant LOC was exceeded for terrestrial and aquatic vascular plants; there is a concern for potential indirect effects to listed species dependent on terrestrial and/or aquatic vascular plants for habitat, feeding, or cover requirements.

4. Critical Habitat

In the evaluation of pesticide effects on designated critical habitat, consideration is given to the physical and biological features (constituent elements) of a critical habitat identified by the U.S. Fish and Wildlife and National Marine Fisheries Services as essential to the conservation of a listed species and which may require special management considerations or protection. The evaluation of impacts for a baseline pesticide risk assessment focuses on the biological features that are constituent elements and is accomplished using the baseline taxonomic analysis (risk quotients, RQs) and listed species levels of concern (LOCs) that are used to evaluate direct and indirect effects to listed animals.

The baseline risk assessment has identified potential concerns for indirect effects on listed species for those animals and plants dependant upon birds, terrestrial-phase amphibians, reptiles, mammals, terrestrial plants, and aquatic vascular plants. In light of the potential for indirect effects, the next step for EPA and the Service(s) is to identify which listed species and critical habitat are potentially implicated. Analytically, the identification of such species and critical habitat can occur in either of two ways. First, the agencies could determine whether the action area overlaps critical habitat or the occupied range of any listed species. If so, EPA would examine whether the pesticide's potential impacts on non-listed species would affect the listed species indirectly or directly affect a constituent element of the critical habitat. Alternatively, the agencies could determine which listed species depend on biological resources, or have constituent elements that fall into, the taxa that may be directly or indirectly impacted by the pesticide. Then EPA would determine whether use of the pesticide overlaps the critical habitat or the occupied range of those listed species. At present, the information reviewed by EPA does not permit use of either analytical approach to make a definitive identification of species that are potentially impacted indirectly or critical habitats that is potentially impacted directly by the use of the pesticide. EPA and the Service(s) are working together to conduct the necessary analysis.

This baseline risk assessment for critical habitat provides a listing of potential biological features that, if they are constituent elements of one or more critical habitats would be of potential concern. These correspond to the taxa identified above as being of potential concern for indirect effects and include the following: birds, reptiles, terrestrial-phase amphibians, mammals, aquatic vascular plants and terrestrial plants. This list should serve as an initial step in problem formulation for further assessment of critical habitat impacts outlined above, should additional work be necessary.

5. Direct Effect Co-occurrence Analysis

For the proposed uses of flurprimidol, LOCATES was run for all listed birds, reptiles, terrestrial-phase amphibians, mammals, terrestrial plants, and aquatic vascular plants to determine the potential for co-occurrence of listed animal and plant species located within areas of expected pesticide use. When baseline assessment information suggests that a listed species occurs in counties where a pesticide is used, there is a potential for a direct effect from flurprimidol use, should exposure actually occur. The taxa that reside in those areas, and the basis for the designation, are in **Table VI-7** and **Appendix F**. Additional analysis of listed animal and plants locations, refinement of the action area associated with flurprimidol regulatory decisions, and the biology of the potentially affected species would be needed before an effects determination can be made for any of the co-located species identified by this assessment.

LOCATES is used to preliminarily identify areas where listed animals and plants could be located within the counties in USA where the proposed uses for flurprimidol are labeled. However, LOCATES does not include county-level location information for non-crop uses, the preliminary analysis was not performed to identify those areas. Consequently, based on the information available at this step in the assessment process, it is presumed that all listed bird, terrestrial-phase amphibian, reptile, mammals, terrestrial plant, and aquatic plant species are potentially directly affected from flurprimidol uses for where turf grasses and ornamentals are

grown. Such potential concerns are limited by the true potential for exposures of critical resources to modeled flurprimidol levels. LOCATES identified >1200 endangered/threatened bird, terrestrial-phase amphibian, reptile, mammals, terrestrial plant, and aquatic plant species located in areas where turf grasses and ornamentals are grown. Consequently, based on the information available, it is presumed listed species reside in areas of expected pesticide use (Table VI-7).

Table VI-7. Number of Listed Species Located Where Turf Grass and Ornamentals are Grown in the United States of America.		
Non-crop	No. of Affected States	No. of Species
Turf grass and ornamentals	All	>1200

6. Indirect Effect Co-occurrence Analysis

In accordance with established procedures, such findings suggest a potential concern for indirect effects to listed animal and plant species with both narrow (i.e., species that are obligates or have very specific habitat or feeding requirements) and general dependencies (i.e., cover type requirements) on plants or animals as a resource or important habitat component. This analysis considered all animal and plant taxonomic groups (i.e., mammal, bird, amphibian, reptile, fish, crustacean, mollusks, arachnid, insect, dicot, monocot, ferns, conf/cycds, and lichen) that depend on those listed animal species; terrestrial and aquatic plants that require birds as pollinators or seed dispersers; species that require reptile burrows for shelter or breeding habitats; and aquatic animals and plants that require cover requirements. Again, no county-level analysis was performed for the non-crop uses. The animal and plant species that reside in those areas and the basis for the designation are summarized in Table VI-8, below. Such potential concerns are limited by the true potential for exposures of critical animal and plant species resources to modeled flurprimidol levels and the relationship between 'directly affected' listed species and 'indirectly affected' listed species. Consequently, additional analysis of listed species locations, refinement of the action area associated with flurprimidol regulatory decisions, and the biology of the potentially affected species would be needed before an effects determination can be made for any of the co-located species identified by this assessment for potential indirect effects.

Table VI-8. Listed Taxonomic Groups Potentially at Risk for Direct or Indirect Effects as a Result of Flurprimidol Applications (Applications are for Terrestrial and Residential Outdoor Uses where Turf Grass and Ornamentals are grown Nationwide)

Listed Taxon	Direct Effects	Use of Direct Effects Concern	Indirect Effects	Use of Indirect Effects Concern
Terrestrial and Semi-Aquatic Plants	Yes	All	Yes ^{3,4,5,6}	All
Beneficial Insects	No	None	Yes ^{3,4,5,6}	All
Birds, Reptiles, Terrestrial-phase Amphibians ¹	Yes	All	Yes ^{3,4,5,6}	All
Mammals	Yes	All	Yes ^{3,4,5}	All
Aquatic Vascular Plants	Yes	All	Yes ^{3,4,5}	All
Freshwater Fish and Aquatic-phase Amphibians ²	No	None	Yes ^{5,6}	All
Freshwater Crustaceans	No	None	Yes ^{5,6}	All
Freshwater Mollusks	No	None	Yes ^{5,6}	All
Estuarine/marine Fish	No	None	No	None
Estuarine/marine Crustaceans	No	None	No	None
Estuarine/marine Mollusks	No	None	No	None
Aquatic Nonvascular Plants	No	None	Yes ^{3,4,5,6}	All

- 1 Birds are used as surrogate species for terrestrial-phase amphibians and reptiles; therefore, potential direct and indirect effects to endangered avian, terrestrial-phase amphibians and reptilian species are considered equivalent.
- 2 Fish are used as a surrogate for aquatic phase amphibians; therefore, potential direct and indirect effects to endangered fish and aquatic-phase amphibian species are considered equivalent.
- 3 Potential indirect effects on a taxon attributable to direct effects on birds, terrestrial-phase amphibians and reptiles.
- 4 Potential indirect effects on a taxon attributable to direct effects on mammals.
- 5 Potential indirect effects on a taxon attributable to direct effects on terrestrial dicots and monocots.
- 6 Potential indirect effects on a taxon attributable to direct effects on alga and diatoms.

VII. Description of Assumptions, Limitations, Uncertainties, Strengths, and Data Gaps

Limitations of available methods of assessing risk and gaps in submitted data lead to uncertainty in risk conclusions. In assessing risk from flurprimidol use, major uncertainties arise from lack of tools to estimate exposure from limited residential use patterns in urban areas and outdoor use patterns in golf resorts, forestry, right-of-way, and industrial areas. Assumptions have therefore been made which are expected to lead to conservative estimates of risk.

A. Use Pattern

Flurprimidol is labeled for outdoor and residential uses only and application rates are expressed as pounds active ingredient per gallon. Quantifying risk, then, requires that assumptions be made about volume applied so that rates can be determined in terms of the amount of active ingredient applied per unit area, expressed as lbs a.i./A. This may not be representative of the small-scale residential and outdoor uses for which some flurprimidol products are intended. Additionally, the maximum number of applications allowed is not specified, and so an upper bound was estimated based on the length of the growing season and the minimum application interval. This led to an assumption of multiple applications per year, which is likely to be greater

than in typical use. For modeling purposes, it is assumed that flurprimidol is applied at this rate over the entire field considered by modeling applications. These assumptions about use and application are conservative and expected to lead to overestimation of risk.

B. Environmental Fate and Transport

The environmental fate database for parent flurprimidol is largely complete. The primary data gaps are in identifying degradates and characterizing their fate. Several major degradates have not been identified. Understanding of the fate properties of the major degradates is limited due to lack of fate studies for these compounds and deficiencies in studies of the parent compound.

C. Aquatic Exposure Estimates

Aquatic exposure estimates were developed using GENEEC2, a Tier I screening level model designed to estimate high level potential exposure in vulnerable environments. The model uses a chemical's label application information, its soil/water partition data and its degradation kinetics to estimate exposure values in a standard agricultural field / farm pond scenario. The program is generic in that it does not consider differences in climate, soils, topography or crop in estimating potential pesticide exposure. The standard pond scenario assumes that rainfall onto a treated, 10 hectare agricultural field causes pesticide-laden runoff into a one hectare; 20,000 cubic meter volume; 2.00 meter deep water-body. The farm pond represents a well mixed, static water body which has no flow through and so does not account for pesticide removal through flow through or water releases. The standard runoff scenario assumes uniform soils and agronomic management practices across the standard 10 hectare field.

This standard pond scenario is designed to represent agricultural uses and may not be representative of residential uses like those of flurprimidol. The model requires assumptions about the use pattern for flurprimidol, as described above, which are expected to lead to overestimates of exposure. The model also cannot account for some factors specific to residential uses such as banded or spot treatments. Default assumptions about spray drift are likely to be conservative for the hose-end and tank-type sprayers used for application of flurprimidol. Residential areas include both pervious and impervious surfaces; pesticides are usually applied to pervious surfaces with some reaching impervious surfaces through overspray. Tier I modeling does not account for the different runoff characteristics of these surfaces. The assumption that the entire 10-ha area is treated with flurprimidol is will outweigh any of these uncertainties.

Due to these uncertainties, estimates of risk to aquatic organisms are likely to be overprotective, but these estimates did not result in LOC exceedances for any risk categories for which there were toxicity data available.

D. Terrestrial Exposure Estimates

The TREX model was used to estimates potential exposure to terrestrial animals. The model assumes a default half-life of 35 days for residues on food items. Based on the rapid photolysis observed in flurprimidol fate studies, it is possible that this half-life is over conservative. The

model also assumes that birds and mammals are feeding exclusively within areas where flurprimidol is used. Given the small-scale nature of the use, it is unlikely that animals will obtain all dietary items within the treated area. Additionally, terrestrial exposure estimates rely on the same conservative assumptions about application rates as discussed above. Some underestimation of exposure is possible due to the fact that estimates are based primarily on dietary consumption of foliar residues and do not account for ingestion of residues by animals in drinking water or contaminated grit, ingestion through preening activities, or uptake through inhalation or dermal absorption by terrestrial animals. Along with the other conservative assumptions used, though, estimates of terrestrial exposure are still expected to be overprotective.

E. Ecological Effects

Species Selection and Sensitivity

There are a number of areas of uncertainty in the terrestrial and the aquatic animal risk assessments that could potentially cause an underestimation of risk. Use of toxicity data on representative species does not provide information on the potential variability in susceptibility to acute and chronic exposures. For baseline terrestrial risk assessments, a generic bird or mammal is assumed to occupy either the treated field or adjacent areas receiving the pesticide at a rate commensurate with the treatment rate on the field. The actual habitat requirements of any particular terrestrial species are not considered, and it is assumed that species occupy, exclusively and permanently, the treated area being modeled. This assumption leads to a maximum level of exposure in the risk assessment.

Although the baseline risk assessment relies on a selected toxicity endpoint from the most sensitive species tested, it does not necessarily mean that the selected toxicity endpoints reflect sensitivity of the most sensitive species existing in a given environment. The relative position of the most sensitive species tested in the distribution of all possible species is a function of the overall variability among species to a particular chemical. In the case of listed species, there is uncertainty regarding the relationship of the listed species' sensitivity and the most sensitive species tested.

Surrogates were used to predict potential risks for species with no data (i.e., reptiles and amphibians). It was assumed that the use of surrogate effects data is sufficiently conservative to apply to the broad range of species within taxonomic groups. If other species are more or less sensitive to flurprimidol than the surrogates, risks may be under- or overestimated, respectively. In addition, since terrestrial-phase amphibians and reptiles do not produce eggs in the same manner as birds, EFED is uncertain how the observed adverse effects in avian reproduction studies will affect reproduction in terrestrial-phase amphibians and reptiles.

Age class and sensitivity of effects thresholds

Scientists generally recognize that the age of the test animal may have a significant effect on the observed sensitivity to a toxicant. In a baseline assessment of acute toxicity in fish, data are collected on juveniles weighing 0.1 to 5 grams. For aquatic invertebrates, the recommended acute testing is performed on immature age classes (e.g., first instar for daphnids, second instar for amphipods, stoneflies and mayflies, and third instar for midges). Similarly, acute dietary

testing with birds is also performed on juveniles, with mallard ducks tested at 5-10 days of age and quail at 10-14 days of age.

Testing of juveniles may overestimate the toxicity of direct acting pesticides in adults. As juvenile animals do not have fully developed metabolic systems, they may not possess the ability to transform and detoxify xenobiotics equivalent to the older/adult animal. The baseline risk assessment has no current provisions for a generally applied method that accounts for this uncertainty. In so far as the available toxicity data may provide ranges of sensitivity information with respect to age class, the risk assessment uses the most sensitive life-stage information as the conservative baseline endpoint.

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APPENDIX A: GENEEC EECs

RUN No. 5 FOR 690-46 ON 0.26 12 * INPUT VALUES *

RATE (#/AC) ONE(MULT)	No.APPS & INTERVAL	SOIL Kd	SOLUBIL (PPM)	APPL TYPE (%DRIFT)	NO-SPRAY ZONE(FT)	INCRP (IN)
.260(3.008)	12 14	2.8	130.0	GRHIFI(6.6)	.0	.0

FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (POND)	PHOTOLYSIS (POND-EFF)	METABOLIC (POND)	COMBINED (POND)
1444.00	0	N/A	1.40-	173.60	.00 173.60

GENERIC EECs (IN MICROGRAMS/LITER (PPB)) Version 2.0 Aug 1, 2001

PEAK GEEC	MAX 4 DAY AVG GEEC	MAX 21 DAY AVG GEEC	MAX 60 DAY AVG GEEC	MAX 90 DAY AVG GEEC
127.64	127.06	123.73	116.56	111.46

RUN No. 1 FOR 690-46 ON 0.69 * INPUT VALUES *

RATE (#/AC) ONE(MULT)	No.APPS & INTERVAL	SOIL Kd	SOLUBIL (PPM)	APPL TYPE (%DRIFT)	NO-SPRAY ZONE(FT)	INCRP (IN)
.690(3.272)	5 56	2.8	130.0	GRHIFI(6.6)	.0	.0

FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (POND)	PHOTOLYSIS (POND-EFF)	METABOLIC (POND)	COMBINED (POND)
1444.00	0	N/A	1.40-	173.60	.00 173.60

GENERIC EECs (IN MICROGRAMS/LITER (PPB)) Version 2.0 Aug 1, 2001

PEAK GEEC	MAX 4 DAY AVG GEEC	MAX 21 DAY AVG GEEC	MAX 60 DAY AVG GEEC	MAX 90 DAY AVG GEEC
138.32	137.69	134.08	126.31	120.78

RUN No. 3 FOR 690-19 ON .75 * INPUT VALUES *

RATE (#/AC) ONE(MULT)	No.APPS & INTERVAL	SOIL Kd	SOLUBIL (PPM)	APPL TYPE (%DRIFT)	NO-SPRAY INCORP ZONE(FT)	INCORP (IN)
.750(2.955)	4 21	2.8	130.0	GRANUL(.0)	.0	.0

FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (POND)	PHOTOLYSIS (POND-EFF)	METABOLIC (POND)	COMBINED (POND)
1444.00	0	N/A	1.40-	173.60	.00 173.60

GENERIC EECs (IN MICROGRAMS/LITER (PPB)) Version 2.0 Aug 1, 2001

PEAK GEEC	MAX 4 DAY AVG GEEC	MAX 21 DAY AVG GEEC	MAX 60 DAY AVG GEEC	MAX 90 DAY AVG GEEC
116.99	116.43	113.34	106.71	102.00

RUN No. 8 FOR 67690-19 ON 3 1 app * INPUT VALUES *

RATE (#/AC) ONE(MULT)	No.APPS & INTERVAL	SOIL Kd	SOLUBIL (PPM)	APPL TYPE (%DRIFT)	NO-SPRAY INCORP ZONE(FT)	INCORP (IN)
3.000(3.000)	1 1	2.8	130.0	GRANUL(.0)	.0	.0

FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (POND)	PHOTOLYSIS (POND-EFF)	METABOLIC (POND)	COMBINED (POND)
1444.00	0	N/A	1.40-	173.60	.00 173.60

GENERIC EECs (IN MICROGRAMS/LITER (PPB)) Version 2.0 Aug 1, 2001

PEAK GEEC	MAX 4 DAY AVG GEEC	MAX 21 DAY AVG GEEC	MAX 60 DAY AVG GEEC	MAX 90 DAY AVG GEEC
118.76	118.19	115.06	108.33	103.54

RUN No. 14 FOR 690-17 ON 1.5 by 3 5 * INPUT VALUES *

RATE (#/AC) ONE(MULT)	No.APPS & INTERVAL	SOIL Kd	SOLUBIL (PPM)	APPL TYPE (%DRIFT)	NO-SPRAY INCORP ZONE(FT)	INCORP (IN)
1.500(2.960)	2 56	2.8	130.0	GRANUL(.0)	.0	.0

FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

METABOLIC	DAYS UNTIL	HYDROLYSIS	PHOTOLYSIS	METABOLIC	COMBINED
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(FIELD)	RAIN/RUNOFF	(POND)	(POND-EFF)	(POND)	(POND)
1444.00	0	N/A	1.40-	173.60	.00 173.60

GENERIC EECs (IN MICROGRAMS/LITER (PPB)) Version 2.0 Aug 1, 2001

PEAK GEEC	MAX 4 DAY AVG GEEC	MAX 21 DAY AVG GEEC	MAX 60 DAY AVG GEEC	MAX 90 DAY AVG GEEC
117.19	116.63	113.53	106.89	102.17

RATE (#/AC) ONE(MULT)	No.APPS & INTERVAL	SOIL Kd	SOLUBIL (PPM)	APPL TYPE (%DRIFT)	NO-SPRAY INCORP ZONE(FT)	(IN)
.750(2.970)	4 14	2.8	130.0	GRHIFI(6.6)	.0	.0

FIELD AND STANDARD POND HALFLIFE VALUES (DAYS)

METABOLIC (FIELD)	DAYS UNTIL RAIN/RUNOFF	HYDROLYSIS (POND)	PHOTOLYSIS (POND-EFF)	METABOLIC (POND)	COMBINED (POND)
1444.00	0	N/A	1.40-	173.60	.00 173.60

GENERIC EECs (IN MICROGRAMS/LITER (PPB)) Version 2.0 Aug 1, 2001

PEAK GEEC	MAX 4 DAY AVG GEEC	MAX 21 DAY AVG GEEC	MAX 60 DAY AVG GEEC	MAX 90 DAY AVG GEEC
126.97	126.39	123.08	115.96	110.89

APPENDIX B. PRZM /EXAMS EEC and Output

stored as FLn1G.out

Chemical: Flurprimidol

PRZM environment: FLnurserySTD_V2.txt modified Tuesday, 27 May 2008 at 11:22:34

EXAMS environment: pond298.exv modified Tuesday, 26 August 2008 at 06:14:08

Metfile: w12839.dvf modified Tuesday, 26 August 2008 at 06:14:20

Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	19.2	19.03	18.37	17.02	16.17	5.679
1962	40.84	40.52	39.38	37.28	35.5	18.07
1963	27.71	27.52	26.89	25.46	24.37	20.29
1964	34.65	34.38	33.36	31.24	29.81	19.08
1965	27.15	26.99	26.72	25.75	24.76	19.27
1966	18.39	18.29	17.88	16.98	16.32	14.1
1967	65.79	65.29	64.01	60.07	57.27	26.28
1968	53.32	52.92	51.72	48.7	46.69	35.39
1969	34.24	34.06	33.3	31.6	30.38	26.52
1970	22.17	22.06	21.57	20.59	19.8	17.23
1971	14.7	14.6	14.27	13.66	13.16	11.32
1972	15.44	15.32	14.88	14	13.4	9.437
1973	45.37	45.16	44.27	42.26	40.33	19.35
1974	77.59	76.96	74.75	70.41	67.3	36.97
1975	51.54	51.18	50.05	47.51	45.44	38.33
1976	36.28	36.12	35.16	33.22	31.8	26.66
1977	28.86	28.69	28.4	27.15	26.05	20.59
1978	19.27	19.16	18.7	17.72	17.04	14.98
1979	13.89	13.82	13.67	13.21	12.69	10.43
1980	43.53	43.27	42.4	39.59	37.62	17.46
1981	42.34	42.18	41.1	38.63	36.78	25.33
1982	26.69	26.53	25.84	24.35	23.32	19.93
1983	16.92	16.8	16.63	15.96	15.38	13.13
1984	50.84	50.41	49.95	46.86	44.47	21.07
1985	109	109	106	99.46	94.69	48.2
1986	67.86	67.44	65.7	61.93	59.25	45.62
1987	36.17	36.01	35.58	33.73	32.33	26.41
1988	75.73	75.1	73.48	68.63	65.04	34.25
1989	52.28	51.92	50.65	47.91	45.77	37.1
1990	45.53	45.27	44.44	42.07	40.38	30.13

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly		
0.032258064516129			109	109	106	99.46	94.69	48.2
0.0645161290322581			77.59	76.96	74.75	70.41	67.3	45.62
0.0967741935483871			75.73	75.1	73.48	68.63	65.04	38.33
0.129032258064516			67.86	67.44	65.7	61.93	59.25	37.1
0.161290322580645			65.79	65.29	64.01	60.07	57.27	36.97
0.193548387096774			53.32	52.92	51.72	48.7	46.69	35.39
0.225806451612903			52.28	51.92	50.65	47.91	45.77	34.25
0.258064516129032			51.54	51.18	50.05	47.51	45.44	30.13
0.290322580645161			50.84	50.41	49.95	46.86	44.47	26.66
0.32258064516129	45.53		45.27	44.44	42.26	40.38	26.52	
0.354838709677419			45.37	45.16	44.27	42.07	40.33	26.41
0.387096774193548			43.53	43.27	42.4	39.59	37.62	26.28
0.419354838709677			42.34	42.18	41.1	38.63	36.78	25.33
0.451612903225806			40.84	40.52	39.38	37.28	35.5	21.07
0.483870967741936			36.28	36.12	35.58	33.73	32.33	20.59
0.516129032258065			36.17	36.01	35.16	33.22	31.8	20.29
0.548387096774194			34.65	34.38	33.36	31.6	30.38	19.93
0.580645161290323			34.24	34.06	33.3	31.24	29.81	19.35

0.612903225806452	28.86	28.69	28.4	27.15	26.05	19.27
0.645161290322581	27.71	27.52	26.89	25.75	24.76	19.08
0.67741935483871	27.15	26.99	26.72	25.46	24.37	18.07
0.709677419354839	26.69	26.53	25.84	24.35	23.32	17.46
0.741935483870968	22.17	22.06	21.57	20.59	19.8	17.23
0.774193548387097	19.27	19.16	18.7	17.72	17.04	14.98
0.806451612903226	19.2	19.03	18.37	17.02	16.32	14.1
0.838709677419355	18.39	18.29	17.88	16.98	16.17	13.13
0.870967741935484	16.92	16.8	16.63	15.96	15.38	11.32
0.903225806451613	15.44	15.32	14.88	14	13.4	10.43
0.935483870967742	14.7	14.6	14.27	13.66	13.16	9.437
0.967741935483871	13.89	13.82	13.67	13.21	12.69	5.679
0.1	74.943	74.334	72.702	67.96	64.461	38.207
						Average of yearly averages: 23.6202

Inputs generated by pe5.pl - November 2006

Data used for this run:

Output File: FLn1G

Metfile: w12839.dvf

PRZM scenario: FLnurserySTD_V2.txt

EXAMS environment file: pond298.exv

Chemical Name: Flurprimidol

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	312.3	g/mol	
Henry's Law Const.	henry	3.97e-09	atm-m ³ /mol	
Vapor Pressure	vapr	3.64e-07	torr	
Solubility	sol	130	mg/L	
Kd	Kd	2.78	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	1.4	days	Half-life
Aerobic Aquatic Metabolism	kbacw	0	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	1444	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method: CAM	1	integer	See PRZM manual	
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	3.36	kg/ha	
Application Efficiency:	APPEFF	1.00	fraction	
Spray Drift	DRFT	0.00	fraction of application rate applied to pond	
Application Date	Date	08-08	dd/mm or dd/mm/yy or dd-mm or dd-mm/yy	

Record 17: FILTRA

IPSCND 1

UPTKF

Record 18: PLVKRT

PLDKRT

FEXTRC0.5

Flag for Index Res. Run IR EPA Pond

Flag for runoff calc. RUNOFFnone none, monthly or total(average of entire run)

stored as MIn1G.out

Chemical: Flurprimidol

PRZM environment: MlnurserySTD_V2.txt modified Sunday, 30 September 2007 at 23:05:00

EXAMS environment: pond298.exv modified Tuesday, 26 August 2008 at 06:14:08

Metfile: w14840.dvf modified Tuesday, 26 August 2008 at 06:15:06

Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	11.26	11.19	10.96	10.43	9.988	6.402
1962	10.69	10.68	10.47	10.09	9.801	7.558
1963	13.33	13.3	13.04	12.38	11.88	8.666

1964	13.42	13.34	13.12	12.67	12.23	9.182
1965	14.89	14.8	14.51	13.83	13.3	9.997
1966	18.9	18.79	18.38	17.82	17.2	12.46
1967	14.5	14.43	14.23	13.63	13.13	10.47
1968	13.09	13.05	12.81	12.3	11.87	9.223
1969	19.11	19.03	18.92	18.12	17.45	12.55
1970	11.4	11.37	11.27	11.02	10.86	9.149
1971	15.4	15.31	14.92	14.13	13.62	10.21
1972	18.31	18.28	18.08	17.52	16.94	12.66
1973	11.47	11.43	11.35	11.1	11.02	9.441
1974	14.27	14.19	13.88	13.5	13.08	9.9
1975	14.56	14.55	14.4	13.77	13.26	10.12
1976	28.89	28.74	28.13	26.73	25.62	17.63
1977	31.08	30.93	30.4	28.85	27.63	20.52
1978	34.9	34.77	34.44	33.5	32.37	23.96
1979	26.98	26.85	26.55	25.45	24.62	19.69
1980	16.92	16.85	16.63	16.16	15.86	13.33
1981	16.99	16.94	16.65	15.85	15.25	11.82
1982	26.64	26.59	26.27	25.52	24.65	17.72
1983	29.22	29.05	28.85	28.01	27.26	20.31
1984	25.47	25.45	25.36	24.63	23.85	18.54
1985	20.34	20.23	19.88	19.3	18.67	14.83
1986	21.66	21.53	21.04	20.32	19.67	14.93
1987	22	21.86	21.38	20.43	19.79	15.4
1988	19.04	18.92	18.68	18.07	17.37	13.67
1989	15.79	15.71	15.58	15.32	14.97	11.95
1990	27.57	27.38	26.93	25.95	25.03	17.88

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly		
0.032258064516129			34.9	34.77	34.44	33.5	32.37	23.96
0.0645161290322581			31.08	30.93	30.4	28.85	27.63	20.52
0.0967741935483871			29.22	29.05	28.85	28.01	27.26	20.31
0.129032258064516			28.89	28.74	28.13	26.73	25.62	19.69
0.161290322580645			27.57	27.38	26.93	25.95	25.03	18.54
0.193548387096774			26.98	26.85	26.55	25.52	24.65	17.88
0.225806451612903			26.64	26.59	26.27	25.45	24.62	17.72
0.258064516129032			25.47	25.45	25.36	24.63	23.85	17.63
0.290322580645161			22	21.86	21.38	20.43	19.79	15.4
0.32258064516129	21.66		21.53	21.04	20.32	19.67	14.93	
0.354838709677419			20.34	20.23	19.88	19.3	18.67	14.83
0.387096774193548			19.11	19.03	18.92	18.12	17.45	13.67
0.419354838709677			19.04	18.92	18.68	18.07	17.37	13.33
0.451612903225806			18.9	18.79	18.38	17.82	17.2	12.66
0.483870967741936			18.31	18.28	18.08	17.52	16.94	12.55
0.516129032258065			16.99	16.94	16.65	16.16	15.86	12.46
0.548387096774194			16.92	16.85	16.63	15.85	15.25	11.95
0.580645161290323			15.79	15.71	15.58	15.32	14.97	11.82
0.612903225806452			15.4	15.31	14.92	14.13	13.62	10.47
0.645161290322581			14.89	14.8	14.51	13.83	13.3	10.21
0.67741935483871	14.56		14.55	14.4	13.77	13.26	10.12	
0.709677419354839			14.5	14.43	14.23	13.63	13.13	9.997
0.741935483870968			14.27	14.19	13.88	13.5	13.08	9.9
0.774193548387097			13.42	13.34	13.12	12.67	12.23	9.441
0.806451612903226			13.33	13.3	13.04	12.38	11.88	9.223
0.838709677419355			13.09	13.05	12.81	12.3	11.87	9.182
0.870967741935484			11.47	11.43	11.35	11.1	11.02	9.149
0.903225806451613			11.4	11.37	11.27	11.02	10.86	8.666
0.935483870967742			11.26	11.19	10.96	10.43	9.988	7.558
0.967741935483871			10.69	10.68	10.47	10.09	9.801	6.402

0.1 29.187 29.019 28.778 27.882 27.096 20.248

Inputs generated by pe5.pl - November 2006

Data used for this run:

Output File: MIn1G

Metfile: w14840.dvf

PRZM scenario: MInurserySTD_V2.txt

EXAMS environment file: pond298.exv

Chemical Name: Flurprimidol

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	312.3	g/mol	
Henry's Law Const.	henry	3.97e-09	atm-m ³ /mol	
Vapor Pressure	vapr	3.64e-07	torr	
Solubility	sol	130	mg/L	
Kd	Kd	2.78	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	1.4	days	Half-life
Aerobic Aquatic Metabolism	kbacw	0	days	Half-life
Anaerobic Aquatic Metabolism	kbacs	0	days	Half-life
Aerobic Soil Metabolism	asm	1444	days	Half-life
Hydrolysis:	pH 7	0	days	Half-life
Method: CAM	1	integer		See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	3.36	kg/ha	
Application Efficiency:	APPEFF	1.00	fraction	
Spray Drift	DRFT	0.00	fraction of application rate applied to pond	
Application Date	Date	08-03	dd/mm or dd/mm/yy or dd-mm or dd-mm/yy	

Record 17: FILTRA

IPSCND 1

UPTKF

Record 18: PLVKRT

PLDKRT

FEXTRC0.5

Flag for Index Res. Run IR EPA Pond

Flag for runoff calc. RUNOFFnone none, monthly or total(average of entire run)

stored as MIn2G.out

Chemical: Flurprimidol

PRZM environment: MInurserySTD_V2.txt modified Sunday, 30 September 2007 at 23:05:00

EXAMS environment: pond298.exv modified Tuesday, 26 August 2008 at 06:14:08

Metfile: w14840.dvf modified Tuesday, 26 August 2008 at 06:15:06

Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	13.88	13.78	13.54	12.92	12.45	7.507
1962	15.23	15.13	14.96	14.41	13.92	11.01
1963	16.21	16.12	15.92	15.35	14.87	12.02
1964	16.72	16.61	16.44	15.84	15.33	12.31
1965	26.44	26.31	25.95	24.97	24.03	17.24
1966	22.83	22.7	22.52	21.89	21.24	17.87
1967	19.32	19.25	19.13	18.46	17.88	15.27
1968	18.2	18.1	17.78	17.22	16.66	13.89
1969	20.56	20.47	20.25	19.61	19.06	15.42
1970	17.61	17.51	17.38	16.91	16.42	13.82
1971	26.16	26	25.84	24.76	23.79	17.55
1972	26.76	26.6	26.31	25.29	24.52	20.05
1973	21.29	21.19	20.81	20.11	19.49	17.07
1974	24.27	24.14	23.92	23.14	22.32	17.54
1975	23.58	23.49	23.25	22.38	21.67	17.9
1976	27.12	26.96	26.44	25.18	24.31	19.97
1977	28	27.84	27.57	26.51	25.63	21.38
1978	43.59	43.39	42.35	40.16	38.65	28.96

1979	52.83	52.54	51.35	48.74	46.73	35.06
1980	35.17	35.07	34.64	33.73	32.88	29.53
1981	32.15	32.03	31.59	30.65	29.68	24.9
1982	40.48	40.29	39.75	37.94	36.53	28.71
1983	33.11	32.95	32.49	31.15	30.61	25.85
1984	31.94	31.76	31.27	29.84	28.87	23.81
1985	26.88	26.72	26.44	25.41	24.59	21.09
1986	25.51	25.39	25.09	24.37	23.66	19.95
1987	27.87	27.76	27.31	26.08	25.16	20.2
1988	24.25	24.13	23.94	23	22.26	18.45
1989	25.55	25.4	24.83	23.89	23.15	18.58
1990	41.5	41.27	40.93	39.17	37.73	27.38

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly		
0.032258064516129			52.83	52.54	51.35	48.74	46.73	35.06
0.0645161290322581			43.59	43.39	42.35	40.16	38.65	29.53
0.0967741935483871			41.5	41.27	40.93	39.17	37.73	28.96
0.129032258064516			40.48	40.29	39.75	37.94	36.53	28.71
0.161290322580645			35.17	35.07	34.64	33.73	32.88	27.38
0.193548387096774			33.11	32.95	32.49	31.15	30.61	25.85
0.225806451612903			32.15	32.03	31.59	30.65	29.68	24.9
0.258064516129032			31.94	31.76	31.27	29.84	28.87	23.81
0.290322580645161			28	27.84	27.57	26.51	25.63	21.38
0.32258064516129 27.87			27.76	27.31	26.08	25.16	21.09	
0.354838709677419			27.12	26.96	26.44	25.41	24.59	20.2
0.387096774193548			26.88	26.72	26.44	25.29	24.52	20.05
0.419354838709677			26.76	26.6	26.31	25.18	24.31	19.97
0.451612903225806			26.44	26.31	25.95	24.97	24.03	19.95
0.483870967741936			26.16	26	25.84	24.76	23.79	18.58
0.516129032258065			25.55	25.4	25.09	24.37	23.66	18.45
0.548387096774194			25.51	25.39	24.83	23.89	23.15	17.9
0.580645161290323			24.27	24.14	23.94	23.14	22.32	17.87
0.612903225806452			24.25	24.13	23.92	23	22.26	17.55
0.645161290322581			23.58	23.49	23.25	22.38	21.67	17.54
0.67741935483871 22.83			22.7	22.52	21.89	21.24	17.24	
0.709677419354839			21.29	21.19	20.81	20.11	19.49	17.07
0.741935483870968			20.56	20.47	20.25	19.61	19.06	15.42
0.774193548387097			19.32	19.25	19.13	18.46	17.88	15.27
0.806451612903226			18.2	18.1	17.78	17.22	16.66	13.89
0.838709677419355			17.61	17.51	17.38	16.91	16.42	13.82
0.870967741935484			16.72	16.61	16.44	15.84	15.33	12.31
0.903225806451613			16.21	16.12	15.92	15.35	14.87	12.02
0.935483870967742			15.23	15.13	14.96	14.41	13.92	11.01
0.967741935483871			13.88	13.78	13.54	12.92	12.45	7.507

0.1 41.398 41.172 40.812 39.047 37.61 28.935

Average of yearly averages: 19.6762333333333

Inputs generated by pe5.pl - November 2006

Data used for this run:

Output File: MIn2G

Metfile: w14840.dvf

PRZM scenario: MInurserySTD_V2.txt

EXAMS environment file: pond298.exv

Chemical Name: Flurprimidol

Description	Variable Name	Value	Units	Comments
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Molecular weight	mwt	312.3	g/mol	
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Henry's Law Const.	henry	3.97e-09	atm-m ³ /mol	
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Vapor Pressure	vapr	3.64e-07	torr	
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Solubilitysol	130	mg/L		
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Kd Kd 2.78 mg/L
 Koc Koc mg/L
 Photolysis half-life kdp 1.4 days Half-life
 Aerobic Aquatic Metabolism kbacw 0 days Half-life
 Anaerobic Aquatic Metabolism kbacs 0 days Half-life
 Aerobic Soil Metabolism asm 1444 days Half-life
 Hydrolysis: pH 7 0 days Half-life
 Method: CAM 1 integer See PRZM manual
 Incorporation Depth: DEPI 0 cm
 Application Rate: TAPP 1.68 kg/ha
 Application Efficiency: APPEFF 1.00 fraction
 Spray Drift DRFT 0.00 fraction of application rate applied to pond
 Application Date Date 08-03 dd/mm or dd/mm or dd-mm or dd-mm
 Interval 1 interval 60 days Set to 0 or delete line for single app.
 app. rate 1 apprate 1.68 kg/ha
 Record 17: FILTRA
 IPSCND 1
 UPTKF
 Record 18: PLVKRT
 PLDKRT
 FEXTRC 0.5
 Flag for Index Res. Run IR EPA Pond
 Flag for runoff calc. RUNOFF none none, monthly or total(average of entire run)

stored as NJn4GS37.out

Chemical: Flurprimidol

PRZM environment: NJnurserySTD_V2.txt modified Sunday, 30 September 2007 at 23:05:00

EXAMS environment: pond298.exv modified Tuesday, 26 August 2008 at 06:14:08

Metfile: w93730.dvf modified Tuesday, 26 August 2008 at 06:16:14

Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	17.03	16.93	16.63	16.28	15.91	10.95
1962	24.4	24.26	24.08	23.39	22.68	17.24
1963	26.97	26.8	26.32	25.47	24.73	19.32
1964	32.61	32.39	31.87	31.55	30.72	23
1965	22	21.87	21.65	21.02	20.37	17.62
1966	19.02	18.95	18.65	18.22	17.62	14.24
1967	31.94	31.72	31.49	30.72	29.99	21.52
1968	38.72	38.5	37.6	36.24	35.2	27.42
1969	30.38	30.19	29.97	29.2	28.28	23.27
1970	24.66	24.54	24.13	23.3	23.22	19.33
1971	22.79	22.67	22.4	21.81	21.12	16.96
1972	22.31	22.18	21.77	21.21	20.94	16.95
1973	22.62	22.49	22.09	21.78	21.51	16.7
1974	28.26	28.1	27.74	26.92	26.07	19.84
1975	41.02	40.76	40.03	38.5	37.08	26.56
1976	33.75	33.55	33.23	32.01	31.03	25.13
1977	32.56	32.36	32.1	31.08	30.25	24.67
1978	39.15	38.93	38.05	36.03	34.76	26.96
1979	24.1	23.97	23.49	22.77	22.1	19.42
1980	25.76	25.63	25.25	24.95	24.63	19.28
1981	31.55	31.35	30.71	29.83	28.96	22.11
1982	22.61	22.48	22.18	21.55	20.94	18.01
1983	30.76	30.57	29.84	28.44	27.87	20.47
1984	41.68	41.45	40.36	38.16	37.26	29.1
1985	33.27	33.08	32.69	31.79	31	25.36
1986	44.22	43.92	43.55	42.57	41.83	30.38
1987	36.99	36.78	36.38	35.99	35.58	28.71
1988	27.35	27.22	26.87	26.45	25.93	21.62
1989	32.58	32.38	31.59	30.45	29.4	21.57
1990	30.08	29.9	29.25	27.86	26.81	21.19

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly		
0.032258064516129			44.22	43.92	43.55	42.57	41.83	30.38
0.0645161290322581			41.68	41.45	40.36	38.5	37.26	29.1
0.0967741935483871			41.02	40.76	40.03	38.16	37.08	28.71
0.129032258064516			39.15	38.93	38.05	36.24	35.58	27.42
0.161290322580645			38.72	38.5	37.6	36.03	35.2	26.96
0.193548387096774			36.99	36.78	36.38	35.99	34.76	26.56
0.225806451612903			33.75	33.55	33.23	32.01	31.03	25.36
0.258064516129032			33.27	33.08	32.69	31.79	31	25.13
0.290322580645161			32.61	32.39	32.1	31.55	30.72	24.67
0.32258064516129	32.58		32.38	31.87	31.08	30.25	23.27	
0.354838709677419			32.56	32.36	31.59	30.72	29.99	23
0.387096774193548			31.94	31.72	31.49	30.45	29.4	22.11
0.419354838709677			31.55	31.35	30.71	29.83	28.96	21.62
0.451612903225806			30.76	30.57	29.97	29.2	28.28	21.57
0.483870967741936			30.38	30.19	29.84	28.44	27.87	21.52
0.516129032258065			30.08	29.9	29.25	27.86	26.81	21.19
0.548387096774194			28.26	28.1	27.74	26.92	26.07	20.47
0.580645161290323			27.35	27.22	26.87	26.45	25.93	19.84
0.612903225806452			26.97	26.8	26.32	25.47	24.73	19.42
0.645161290322581			25.76	25.63	25.25	24.95	24.63	19.33
0.67741935483871	24.66		24.54	24.13	23.39	23.22	19.32	
0.709677419354839			24.4	24.26	24.08	23.3	22.68	19.28
0.741935483870968			24.1	23.97	23.49	22.77	22.1	18.01
0.774193548387097			22.79	22.67	22.4	21.81	21.51	17.62
0.806451612903226			22.62	22.49	22.18	21.78	21.12	17.24
0.838709677419355			22.61	22.48	22.09	21.55	20.94	16.96
0.870967741935484			22.31	22.18	21.77	21.21	20.94	16.95
0.903225806451613			22	21.87	21.65	21.02	20.37	16.7
0.935483870967742			19.02	18.95	18.65	18.22	17.62	14.24
0.967741935483871			17.03	16.93	16.63	16.28	15.91	10.95
0.1	40.833	40.577	39.832	37.968	36.93	28.581	Average of yearly averages: 21.4966666666667	

Inputs generated by pe5.pl - November 2006

Data used for this run:

Output File: NJn4GS37

Metfile: w93730.dvf

PRZM scenario: NJnurserySTD_V2.txt

EXAMS environment file: pond298.exv

Chemical Name: Flurprimidol

Description	Variable Name	Value	Units	Comments
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Molecular weight	mwt	312.3	g/mol	
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Henry's Law Const.	henry	3.97e-09	atm-m ³ /mol	
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Vapor Pressure	vapr	3.64e-07	torr	
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Solubility	sol	130	mg/L	
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Kd	Kd	2.78	mg/L	
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Koc	Koc		mg/L	
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Photolysis half-life	kdp	1.4	days	Half-life
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Aerobic Aquatic Metabolism	kbacw	0	days	Half-life
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Anaerobic Aquatic Metabolism	kbacs	0	days	Half-life
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Aerobic Soil Metabolism	asm	1444	days	Half-life
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Hydrolysis:	pH 7	0	days	Half-life
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Method:	CAM	2	integer	See PRZM manual
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Incorporation Depth:	DEPI	0	cm	
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Application Rate:	TAPP	0.84	kg/ha	
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Application Efficiency:	APPEFF	0.99	fraction	
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Spray Drift	DRFT	0.01	fraction of application rate applied to pond	
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Application Date Date 7-3 dd/mm or dd/mm/mm or dd-mm or dd-mmm
 Interval 1 interval 21 days Set to 0 or delete line for single app.
 app. rate 1 apprate 0.84 kg/ha
 Interval 2 interval 21 days Set to 0 or delete line for single app.
 app. rate 2 apprate 0.84 kg/ha
 Interval 3 interval 21 days Set to 0 or delete line for single app.
 app. rate 3 apprate 0.84 kg/ha
 Record 17: FILTRA
 IPSCND 1
 UPTKF
 Record 18: PLVKRT
 PLDKRT
 FEXTRC 0.5
 Flag for Index Res. Run IR EPA Pond
 Flag for runoff calc. RUNOFFnone none, monthly or total(average of entire run)
 stored as PA turf4GS.out
 Chemical: Flurprimidol
 PRZM environment: PA turfSTD.txt modified Thuday, 23 February 2006 at 18:55:08
 EXAMS environment: pond298.exv modified Tuesday, 26 August 2008 at 06:14:08
 Metfile: w14751.dvf modified Tuesday, 26 August 2008 at 06:15:00
 Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	6.052	6.004	5.843	5.588	5.353	2.102
1962	6.896	6.853	6.679	6.328	6.164	4.79
1963	6.129	6.091	5.919	5.842	5.769	5.26
1964	6.671	6.627	6.453	6.152	5.908	5.093
1965	5.405	5.375	5.253	5.129	5.028	4.546
1966	28.73	28.52	27.66	25.84	24.69	9.883
1967	21.88	21.76	21.28	20.6	20.19	17.04
1968	21.81	21.65	20.99	19.79	19.09	13.8
1969	24.66	24.52	23.87	22.83	22.01	17.14
1970	17.96	17.96	17.95	17.94	17.74	15
1971	15.38	15.28	15.13	14.51	14.01	11.29
1972	11.51	11.46	11.24	10.93	10.76	9.09
1973	30.9	30.67	29.75	27.88	26.68	12.05
1974	22.33	22.23	21.81	20.88	20.18	17.33
1975	14.51	14.45	14.2	13.64	13.23	10.8
1976	9.176	9.122	8.899	8.46	8.178	7.286
1977	7.495	7.495	7.495	7.493	7.387	6.229
1978	5.326	5.325	5.323	5.318	5.254	4.586
1979	7.216	7.168	6.997	6.642	6.392	4.298
1980	7.109	7.064	6.888	6.611	6.023	4.937
1981	7.141	7.103	6.949	6.893	6.751	5.852
1982	5.484	5.483	5.48	5.471	5.41	4.721
1983	3.878	3.862	3.792	3.636	3.521	3.188
1984	3.633	3.611	3.522	3.391	3.309	2.848
1985	5.087	5.052	4.924	4.673	4.542	3.086
1986	7.192	7.149	6.981	6.925	6.738	4.864
1987	7.61	7.564	7.454	7.08	6.803	5.342
1988	5.893	5.86	5.726	5.71	5.637	5.161
1989	14.24	14.14	13.82	13.32	12.83	7.124
1990	10.95	10.9	10.69	10.22	9.888	8.597

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258064516129			30.9	30.67	29.75	27.88
0.0645161290322581			28.73	28.52	27.66	25.84
0.0967741935483871			24.66	24.52	23.87	22.83
0.129032258064516			22.33	22.23	21.81	20.88
0.161290322580645			21.88	21.76	21.28	20.6
0.193548387096774			21.81	21.65	20.99	19.79

0.225806451612903	17.96	17.96	17.95	17.94	17.74	11.29
0.258064516129032	15.38	15.28	15.13	14.51	14.01	10.8
0.290322580645161	14.51	14.45	14.2	13.64	13.23	9.883
0.32258064516129 14.24	14.14	13.82	13.32	12.83	9.09	
0.354838709677419	11.51	11.46	11.24	10.93	10.76	8.597
0.387096774193548	10.95	10.9	10.69	10.22	9.888	7.286
0.419354838709677	9.176	9.122	8.899	8.46	8.178	7.124
0.451612903225806	7.61	7.564	7.495	7.493	7.387	6.229
0.483870967741936	7.495	7.495	7.454	7.08	6.803	5.852
0.516129032258065	7.216	7.168	6.997	6.925	6.751	5.342
0.548387096774194	7.192	7.149	6.981	6.893	6.738	5.26
0.580645161290323	7.141	7.103	6.949	6.642	6.392	5.161
0.612903225806452	7.109	7.064	6.888	6.611	6.164	5.093
0.645161290322581	6.896	6.853	6.679	6.328	6.023	4.937
0.67741935483871 6.671	6.627	6.453	6.152	5.908	4.864	
0.709677419354839	6.129	6.091	5.919	5.842	5.769	4.79
0.741935483870968	6.052	6.004	5.843	5.71	5.637	4.721
0.774193548387097	5.893	5.86	5.726	5.588	5.41	4.586
0.806451612903226	5.484	5.483	5.48	5.471	5.353	4.546
0.838709677419355	5.405	5.375	5.323	5.318	5.254	4.298
0.870967741935484	5.326	5.325	5.253	5.129	5.028	3.188
0.903225806451613	5.087	5.052	4.924	4.673	4.542	3.086
0.935483870967742	3.878	3.862	3.792	3.636	3.521	2.848
0.967741935483871	3.633	3.611	3.522	3.391	3.309	2.102

0.1 24.427 24.291 23.664 22.635 21.828 16.836

Average of yearly averages: 7.77776666666667

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:

Output File: PAturf4GS

Metfile: w14751.dvf

PRZM scenario: PAturfSTD.txt

EXAMS environment file: pond298.exv

Chemical Name: Flurprimidol

Description	Variable Name	Value	Units	Comments
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Molecular weight	mwt	312.3	g/mol	
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Henry's Law Const.	henry	3.97e-09	atm-m ³ /mol	
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Vapor Pressure	vapr	3.64e-07	torr	
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Solubility	sol	130	mg/L	
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Kd	Kd	2.78	mg/L	
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Koc	Koc		mg/L	
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Photolysis half-life	kdp	1.4	days	Half-life
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Aerobic Aquatic Metabolism	kbacw	0	days	Halfife
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Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
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Aerobic Soil Metabolism	asm	1444	days	Halfife
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Hydrolysis:	pH 7	0	days	Half-life
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Method:	CAM	2	integer	See PRZM manual
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Incorporation Depth:	DEPI	0	cm	
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Application Rate:	TAPP	0.84	kg/ha	
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Application Efficiency:	APPEFF	0.99	fraction	
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Spray Drift	DRFT	0.01	fraction of application rate applied to pond	
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Application Date	Date	5-7	dd/mm or dd/mm or dd-mm or dd-mm	
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Interval 1 interval	21	days	Set to 0 or delete line for single app.	
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app. rate 1	apprate	0.84	kg/ha	
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Interval 2 interval	21	days	Set to 0 or delete line for single app.	
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app. rate 2	apprate	0.84	kg/ha	
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Interval 3 interval	21	days	Set to 0 or delete line for single app.	
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app. rate 3	apprate	0.84	kg/ha	
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Record 17: FILTRA

IPSCND 1

UPTKF
Record 18: PLVKRT
PLDKRT
FEXTRC0.5
Flag for Index Res. Run IR EPA Pond
Flag for runoff calc. RUNOFFnone none, monthly or total(average of entire run)
stored as NJn4GS52.out
Chemical: Flurprimidol
PRZM environment: NJnurserySTD_V2.txt modified Sunday, 30 September 2007 at 23:05:00
EXAMS environment: pond298.exv modified Tuesday, 26 August 2008 at 06:14:08
Metfile: w93730.dvf modified Tuesday, 26 August 2008 at 06:16:14
Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	14.28	14.18	13.9	13.3	12.76	6.039
1962	21.36	21.23	20.88	20.28	19.66	13.6
1963	36.08	35.84	35.24	33.71	32.84	23.16
1964	32.84	32.66	32.49	31.62	31.02	24.95
1965	31.11	30.98	30.59	29.61	28.85	23.45
1966	31.6	31.41	30.72	30.32	29.83	23.91
1967	49.36	49.06	47.95	45.45	43.52	28.98
1968	42.55	42.3	41.56	40.3	39.31	33.8
1969	59.1	58.75	57.72	54.76	52.54	36.18
1970	41.73	41.52	41.04	40.7	40.18	35.68
1971	47.01	46.7	45.59	44	42.56	32.5
1972	35.31	35.11	34.87	33.93	33.08	29.16
1973	28.84	28.68	28.3	27.23	26.37	22.77
1974	29.86	29.69	28.99	27.64	26.82	21.03
1975	39.75	39.53	38.77	36.98	35.79	25.58
1976	35.41	35.18	34.68	33.27	32.41	27.32
1977	33.79	33.6	33	31.95	31.31	26.28
1978	68.43	67.96	66.6	65.48	63.37	41.09
1979	69.99	69.57	68.03	64.79	62.33	46.91
1980	47.07	46.79	46.48	46.02	45.52	41.56
1981	43.71	43.46	42.87	41.36	40.31	34.26
1982	34.11	33.91	33.54	32.67	31.93	28.08
1983	28.99	28.81	28.62	27.61	26.73	22.41
1984	30.19	30.03	29.74	28.83	28.17	22.28
1985	32.91	32.7	32.3	31	29.95	23.4
1986	27.51	27.35	27.01	26.61	26.08	21.53
1987	47.9	47.59	46.79	45.46	44.49	29.44
1988	41.6	41.34	40.78	39.07	37.62	31.06
1989	35.4	35.27	34.47	32.74	31.77	26.15
1990	39.21	38.98	38.54	37.16	35.89	28.14

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
0.032258064516129			69.99	69.57	68.03	65.48
0.0645161290322581			68.43	67.96	66.6	64.79
0.0967741935483871			59.1	58.75	57.72	54.76
0.129032258064516			49.36	49.06	47.95	46.02
0.161290322580645			47.9	47.59	46.79	45.46
0.193548387096774			47.07	46.79	46.48	45.45
0.225806451612903			47.01	46.7	45.59	44
0.258064516129032			43.71	43.46	42.87	41.36
0.290322580645161			42.55	42.3	41.56	40.7
0.32258064516129	41.73		41.52	41.04	40.3	39.31
0.354838709677419			41.6	41.34	40.78	39.07
0.387096774193548			39.75	39.53	38.77	37.16
0.419354838709677			39.21	38.98	38.54	36.98
0.451612903225806			36.08	35.84	35.24	33.93
0.483870967741936			35.41	35.27	34.87	33.71

0.516129032258065	35.4	35.18	34.68	33.27	32.41	26.28
0.548387096774194	35.31	35.11	34.47	32.74	31.93	26.15
0.580645161290323	34.11	33.91	33.54	32.67	31.77	25.58
0.612903225806452	33.79	33.6	33	31.95	31.31	24.95
0.645161290322581	32.91	32.7	32.49	31.62	31.02	23.91
0.67741935483871	32.66	32.3	31	29.95	23.45	
0.709677419354839	31.6	31.41	30.72	30.32	29.83	23.4
0.741935483870968	31.11	30.98	30.59	29.61	28.85	23.16
0.774193548387097	30.19	30.03	29.74	28.83	28.17	22.77
0.806451612903226	29.86	29.69	28.99	27.64	26.82	22.41
0.838709677419355	28.99	28.81	28.62	27.61	26.73	22.28
0.870967741935484	28.84	28.68	28.3	27.23	26.37	21.53
0.903225806451613	27.51	27.35	27.01	26.61	26.08	21.03
0.935483870967742	21.36	21.23	20.88	20.28	19.66	13.6
0.967741935483871	14.28	14.18	13.9	13.3	12.76	6.039

0.1 58.126 57.781 56.743 53.886 51.838 40.599

Average of yearly averages: 27.6899666666667

Inputs generated by pe5.pl - November 2006

Data used for this run:

Output File: NJn4GS52

Metfile: w93730.dvf

PRZM scenario: NJnurserySTD_V2.txt

EXAMS environment file: pond298.exv

Chemical Name: Flurprimidol

Description	Variable Name	Value	Units	Comments
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Molecular weight	mwt	312.3	g/mol	
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Henry's Law Const.	henry	3.97e-09	atm-m ³ /mol	
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Vapor Pressure	vapr	3.64e-07	torr	
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Solubility	sol	130	mg/L	
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Kd	Kd	2.78	mg/L	
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Koc	Koc		mg/L	
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Photolysis half-life	kdp	1.4	days	Half-life
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Aerobic Aquatic Metabolism	kbacw	0	days	Half-life
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Anaerobic Aquatic Metabolism	kbacs	0	days	Half-life
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Aerobic Soil Metabolism	asm	1444	days	Half-life
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Hydrolysis:	pH 7	0	days	Half-life
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Method: CAM	2	integer	See PRZM manual	
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Incorporation Depth:	DEPI	0	cm	
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Application Rate:	TAPP	0.84	kg/ha	
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Application Efficiency:	APPEFF	0.99	fraction	
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Spray Drift	DRFT	0.01	fraction of application rate applied to pond	
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Application Date	Date	20-5	dd/mm or dd/mm/mm or dd-mm or dd-mm/mm	
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Interval 1 interval	21	days	Set to 0 or delete line for single app.	
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app. rate 1	apprate	0.84	kg/ha	
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Interval 2 interval	21	days	Set to 0 or delete line for single app.	
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app. rate 2	apprate	0.84	kg/ha	
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Interval 3 interval	21	days	Set to 0 or delete line for single app.	
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app. rate 3	apprate	0.84	kg/ha	
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Record 17: FILTRA

IPSCND 1

UPTKF

Record 18: PLVKRT

PLDKRT

FEXTRC0.5

Flag for Index Res. Run IR EPA Pond

Flag for runoff calc. RUNOFFnone none, monthly or total(average of entire run)

stored as NJn4GS85.out

Chemical: Flurprimidol

PRZM environment: NJnurserySTD_V2.txt modified Sunday, 30 September 2007 at 23:05:00

EXAMS environment: pond298.exv modified Tuesday, 26 August 2008 at 06:14:08
 Metfile: w93730.dvf modified Tuesday, 26 August 2008 at 06:16:14
 Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	21.35	21.2	20.57	20.04	19.52	5.854
1962	41.66	41.42	40.69	39.85	39.44	22.6
1963	43.79	43.55	42.83	42.71	42.34	34.45
1964	41.13	40.89	39.9	37.85	36.68	32.4
1965	33.18	33.17	33.16	32.57	31.6	27.2
1966	58.96	58.54	56.87	53.65	52.12	31.06
1967	47.94	47.68	46.61	45.11	44.24	37.92
1968	39.04	38.81	37.88	37.56	37.1	33.18
1969	34.71	34.49	33.7	33.2	32.16	28.07
1970	34.15	33.96	33.55	32.51	31.48	26.43
1971	69.9	69.51	68.1	65.51	63.31	37.09
1972	59.19	58.89	57.66	55.33	54.04	47.21
1973	51.27	51	49.89	47.54	45.96	39.3
1974	45.64	45.33	44.38	42.66	40.7	32.78
1975	38.84	38.62	37.92	36.56	35.66	31.07
1976	52.73	52.41	51.21	48.66	47.42	33.27
1977	47.54	47.39	46.69	45.43	43.98	39.06
1978	40.24	40.24	40.23	40.21	39.69	34.14
1979	31.52	31.4	30.78	30.07	29.58	25.94
1980	30.61	30.41	30.21	29.77	29.29	25.02
1981	28.46	28.3	28.25	27.75	26.93	23.77
1982	24.75	24.63	24.3	23.9	23.43	20.8
1983	28.98	28.81	28.16	27.5	27.13	20.55
1984	26.94	26.78	26.12	25.57	25.34	22.18
1985	26.13	25.96	25.71	25.15	25.04	20.99
1986	30.14	29.97	29.4	28.84	27.27	20.26
1987	31.41	31.2	30.45	29.12	28.79	24.68
1988	31.6	31.41	30.99	30.47	29.41	23.79
1989	54.03	53.67	52.34	50.72	49.92	30.52
1990	48.02	47.76	46.69	44.42	42.81	36.08

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly		
0.032258064516129			69.9	69.51	68.1	65.51	63.31	47.21
0.0645161290322581			59.19	58.89	57.66	55.33	54.04	39.3
0.0967741935483871			58.96	58.54	56.87	53.65	52.12	39.06
0.129032258064516			54.03	53.67	52.34	50.72	49.92	37.92
0.161290322580645			52.73	52.41	51.21	48.66	47.42	37.09
0.193548387096774			51.27	51	49.89	47.54	45.96	36.08
0.225806451612903			48.02	47.76	46.69	45.43	44.24	34.45
0.258064516129032			47.94	47.68	46.69	45.11	43.98	34.14
0.290322580645161			47.54	47.39	46.61	44.42	42.81	33.27
0.32258064516129 45.64			45.33	44.38	42.71	42.34	33.18	
0.354838709677419			43.79	43.55	42.83	42.66	40.7	32.78
0.387096774193548			41.66	41.42	40.69	40.21	39.69	32.4
0.419354838709677			41.13	40.89	40.23	39.85	39.44	31.07
0.451612903225806			40.24	40.24	39.9	37.85	37.1	31.06
0.483870967741936			39.04	38.81	37.92	37.56	36.68	30.52
0.516129032258065			38.84	38.62	37.88	36.56	35.66	28.07
0.548387096774194			34.71	34.49	33.7	33.2	32.16	27.2
0.580645161290323			34.15	33.96	33.55	32.57	31.6	26.43
0.612903225806452			33.18	33.17	33.16	32.51	31.48	25.94
0.645161290322581			31.6	31.41	30.99	30.47	29.58	25.02
0.67741935483871 31.52			31.4	30.78	30.07	29.41	24.68	
0.709677419354839			31.41	31.2	30.45	29.77	29.29	23.79
0.741935483870968			30.61	30.41	30.21	29.12	28.79	23.77
0.774193548387097			30.14	29.97	29.4	28.84	27.27	22.6

0.806451612903226	28.98	28.81	28.25	27.75	27.13	22.18
0.838709677419355	28.46	28.3	28.16	27.5	26.93	20.99
0.870967741935484	26.94	26.78	26.12	25.57	25.34	20.8
0.903225806451613	26.13	25.96	25.71	25.15	25.04	20.55
0.935483870967742	24.75	24.63	24.3	23.9	23.43	20.26
0.967741935483871	21.35	21.2	20.57	20.04	19.52	5.854

0.1 58.467 58.053 56.417 53.357 51.9 38.946
Average of yearly averages: 28.922133333333

Inputs generated by pc5.pl - November 2006

Data used for this run:

Output File: NJn4GS85

Metfile: w93730.dvf

PRZM scenario: NJnurserySTD_V2.txt

EXAMS environment file: pond298.exv

Chemical Name: Flurprimidol

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	312.3	g/mol	
Henry's Law Const.	henry	3.97e-09	atm-m ³ /mol	
Vapor Pressure	vapr	3.64e-07	torr	
Solubility	sol	130	mg/L	
Kd	Kd	2.78	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	1.4	days	Half-life
Aerobic Aquatic Metabolism	kbacw	0	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	1444	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM 2	integer	See PRZM manual	
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.84	kg/ha	
Application Efficiency:	APPEFF	0.99	fraction	
Spray Drift	DRFT	0.01	fraction of application rate applied to pond	
Application Date	Date	05-08	dd/mm or dd/mm or dd-mm or dd-mmm	
Interval 1 interval	21	days	Set to 0 or delete line for single app.	
app. rate 1	apprate	0.84	kg/ha	
Interval 2 interval	21	days	Set to 0 or delete line for single app.	
app. rate 2	apprate	0.84	kg/ha	
Interval 3 interval	21	days	Set to 0 or delete line for single app.	
app. rate 3	apprate	0.84	kg/ha	

Record 17: FILTRA

IPSCND 1

UPTKF

Record 18: PLVKRT

PLDKRT

FEXTRC0.5

Flag for Index Res. Run IR EPA Pond

Flag for runoff calc. RUNOFFnone none, monthly or total(average of entire run)

stored as PAtur28h5.out

Chemical: Flurprimidol

PRZM environment: PAturSTD.txt modified Thuday, 23 February 2006 at 18:55:08

EXAMS environment: pond298.exv modified Tuesday, 26 August 2008 at 06:14:08

Metfile: w14751.dvf modified Tuesday, 26 August 2008 at 06:15:00

Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	7.805	7.747	7.55	7.199	6.916	2.853
1962	6.862	6.822	6.688	6.378	6.227	5.621
1963	5.944	5.944	5.944	5.943	5.87	5.278
1964	5.641	5.606	5.542	5.384	5.206	4.82

1965	4.84	4.811	4.694	4.488	4.436	4.178
1966	18.17	18.03	17.6	16.56	15.86	7.207
1967	14.14	14.06	13.75	13.32	13.06	11.8
1968	15.87	15.76	15.35	14.58	14.09	10.46
1969	13.07	13	12.85	12.64	12.27	11.09
1970	10	10	9.998	9.987	9.875	8.701
1971	9.675	9.613	9.447	9.139	8.852	7.09
1972	12.98	12.91	12.68	12.21	11.98	8.918
1973	19.39	19.26	18.81	17.85	17.2	10.63
1974	14.68	14.61	14.35	13.75	13.3	11.9
1975	10.32	10.28	10.1	9.7	9.404	8.816
1976	9.359	9.306	9.097	8.644	8.411	7.324
1977	8.091	8.091	8.089	8.085	7.969	6.736
1978	6.778	6.74	6.652	6.515	6.42	5.669
1979	7.741	7.702	7.592	7.352	7.108	5.536
1980	7.506	7.462	7.284	7.004	6.532	5.795
1981	6.779	6.778	6.773	6.654	6.463	5.861
1982	7.216	7.176	7.056	6.867	6.756	5.682
1983	5.262	5.239	5.144	4.931	4.775	4.487
1984	5.05	5.022	4.988	4.953	4.918	4.218
1985	6.201	6.16	6.054	5.778	5.626	4.268
1986	6.124	6.092	6.017	5.923	5.805	5.142
1987	7.608	7.565	7.515	7.276	7.07	5.562
1988	6.233	6.198	6.117	6.099	6.022	5.579
1989	8.679	8.629	8.532	8.324	8.168	6.017
1990	7.3	7.267	7.126	6.94	6.902	6.474

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly	
0.032258064516129			19.39	19.26	18.81	17.85	17.2
0.0645161290322581			18.17	18.03	17.6	16.56	15.86
0.0967741935483871			15.87	15.76	15.35	14.58	14.09
0.129032258064516			14.68	14.61	14.35	13.75	13.3
0.161290322580645			14.14	14.06	13.75	13.32	13.06
0.193548387096774			13.07	13	12.85	12.64	12.27
0.225806451612903			12.98	12.91	12.68	12.21	11.98
0.258064516129032			10.32	10.28	10.1	9.987	9.875
0.290322580645161			10	10	9.998	9.7	9.404
0.32258064516129	9.675		9.613	9.447	9.139	8.852	7.207
0.354838709677419			9.359	9.306	9.097	8.644	8.411
0.387096774193548			8.679	8.629	8.532	8.324	8.168
0.419354838709677			8.091	8.091	8.089	8.085	7.969
0.451612903225806			7.805	7.747	7.592	7.352	7.108
0.483870967741936			7.741	7.702	7.55	7.276	7.07
0.516129032258065			7.608	7.565	7.515	7.199	6.916
0.548387096774194			7.506	7.462	7.284	7.004	6.902
0.580645161290323			7.3	7.267	7.126	6.94	6.756
0.612903225806452			7.216	7.176	7.056	6.867	6.532
0.645161290322581			6.862	6.822	6.773	6.654	6.463
0.67741935483871	6.779		6.778	6.688	6.515	6.42	5.562
0.709677419354839			6.778	6.74	6.652	6.378	6.227
0.741935483870968			6.233	6.198	6.117	6.099	6.022
0.774193548387097			6.201	6.16	6.054	5.943	5.87
0.806451612903226			6.124	6.092	6.017	5.923	5.805
0.838709677419355			5.944	5.944	5.944	5.778	5.626
0.870967741935484			5.641	5.606	5.542	5.384	5.206
0.903225806451613			5.262	5.239	5.144	4.953	4.918
0.935483870967742			5.05	5.022	4.988	4.931	4.775
0.967741935483871			4.84	4.811	4.694	4.488	4.436

0.1 15.751 15.645 15.25 14.497 14.011 11.044
Average of yearly averages: 6.7904

Inputs generated by pe5.pl - Novemeber 2006

Data used for this run:

Output File: PAtur28h5

Metfile: w14751.dvf

PRZM scenario: PAturfSTD.txt

EXAMS environment file: pond298.exv

Chemical Name: Flurprimidol

Description	Variable Name	Value	Units	Comments
Molecular weight	mw1	312.3	g/mol	
Henry's Law Const.	henry	3.97e-09	atm-m ³ /mol	
Vapor Pressure	vapr	3.64e-07	torr	
Solubility	sol	130	mg/L	
Kd	Kd	2.78	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	1.4	days	Half-life
Aerobic Aquatic Metabolism	kbacw	0	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	1444	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM 2	integer		See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.291	kg/ha	
Application Efficiency:	APPEFF	0.99	fraction	
Spray Drift	DRFT	0.01		fraction of application rate applied to pond
Application Date	Date	5-5		dd/mm or dd/mm or dd-mm or dd-mmm
Interval 1 interval	14	days		Set to 0 or delete line for single app.
app. rate 1	apprate	0.291	kg/ha	
Interval 2 interval	14	days		Set to 0 or delete line for single app.
app. rate 2	apprate	0.291	kg/ha	
Interval 3 interval	14	days		Set to 0 or delete line for single app.
app. rate 3	apprate	0.291	kg/ha	
Interval 4 interval	14	days		Set to 0 or delete line for single app.
app. rate 4	apprate	0.291	kg/ha	
Interval 5 interval	14	days		Set to 0 or delete line for single app.
app. rate 5	apprate	0.291	kg/ha	
Interval 6 interval	14	days		Set to 0 or delete line for single app.
app. rate 6	apprate	0.291	kg/ha	
Interval 7 interval	14	days		Set to 0 or delete line for single app.
app. rate 7	apprate	0.291	kg/ha	
Interval 8 interval	14	days		Set to 0 or delete line for single app.
app. rate 8	apprate	0.291	kg/ha	
Interval 9 interval	14	days		Set to 0 or delete line for single app.
app. rate 9	apprate	0.291	kg/ha	
Interval 10	interval	14	days	Set to 0 or delete line for single app.
app. rate 10	apprate	0.291	kg/ha	
Interval 11	interval	14	days	Set to 0 or delete line for single app.
app. rate 11	apprate	0.160	kg/ha	

Record 17: FILTRA

IPSCND 1

UPTKF

Record 18: PLVKRT

PLDKRT

FEXTRC0.5

Flag for Index Res. Run IR EPA Pond

Flag for runoff calc. RUNOFFnone none, monthly or total(average of entire run)

stored as PAtur28h6.out

Chemical: Flurprimidol

PRZM environment: PAturfSTD.txt modified Thuday, 23 February 2006 at 18:55:08

EXAMS environment: pond298.exv modified Tuesday, 26 August 2008 at 06:14:08

Metfile: w14751.dvf modified Tuesday, 26 August 2008 at 06:15:00

Water segment concentrations (ppb)

Year	Peak	96 hr	21 Day	60 Day	90 Day	Yearly
1961	5.422	5.383	5.281	5.123	5.023	2.183
1962	5.968	5.932	5.85	5.794	5.708	4.53
1963	5.718	5.688	5.565	5.558	5.486	4.974
1964	5.594	5.561	5.484	5.38	5.314	4.955
1965	4.83	4.811	4.809	4.805	4.746	4.38
1966	17.98	17.85	17.4	16.47	15.85	7.245
1967	14.34	14.27	13.95	13.51	13.24	11.62
1968	10.42	10.35	10.14	9.846	9.739	8.843
1969	10.43	10.37	10.26	9.895	9.66	8.324
1970	8.345	8.344	8.343	8.338	8.242	7.385
1971	8.704	8.648	8.507	8.281	8.111	6.536
1972	20.39	20.26	19.79	18.86	18.3	11.98
1973	23.11	22.96	22.41	21.49	20.88	14.96
1974	18.21	18.13	17.8	17.06	16.5	14.35
1975	18.01	17.91	17.51	16.84	16.34	11.77
1976	18.1	17.99	17.63	16.82	16.19	12.96
1977	15.82	15.82	15.81	15.78	15.55	12.46
1978	10.1	10.1	10.09	10.09	9.963	8.973
1979	9.145	9.099	8.99	8.809	8.567	7.221
1980	9.383	9.324	9.121	8.811	7.913	6.577
1981	8.543	8.54	8.528	8.369	8.124	7.139
1982	6.298	6.298	6.295	6.286	6.215	5.598
1983	5.037	5.014	4.921	4.713	4.561	3.988
1984	3.891	3.891	3.891	3.829	3.725	3.57
1985	6.421	6.376	6.271	6.117	6.016	3.902
1986	7.552	7.508	7.413	7.233	7.1	5.859
1987	7.615	7.568	7.481	7.327	7.289	6.214
1988	6.716	6.716	6.715	6.711	6.624	5.952
1989	8.089	8.04	7.922	7.744	7.731	5.574
1990	7.636	7.589	7.454	7.271	6.862	6.062

Sorted results

Prob.	Peak	96 hr	21 Day	60 Day	90 Day	Yearly		
0.032258064516129			23.11	22.96	22.41	21.49	20.88	14.96
0.0645161290322581			20.39	20.26	19.79	18.86	18.3	14.35
0.0967741935483871			18.21	18.13	17.8	17.06	16.5	12.96
0.129032258064516			18.1	17.99	17.63	16.84	16.34	12.46
0.161290322580645			18.01	17.91	17.51	16.82	16.19	11.98
0.193548387096774			17.98	17.85	17.4	16.47	15.85	11.77
0.225806451612903			15.82	15.82	15.81	15.78	15.55	11.62
0.258064516129032			14.34	14.27	13.95	13.51	13.24	8.973
0.290322580645161			10.43	10.37	10.26	10.09	9.963	8.843
0.32258064516129 10.42			10.35	10.14	9.895	9.739	8.324	
0.354838709677419			10.1	10.1	10.09	9.846	9.66	7.385
0.387096774193548			9.383	9.324	9.121	8.811	8.567	7.245
0.419354838709677			9.145	9.099	8.99	8.809	8.242	7.221
0.451612903225806			8.704	8.648	8.528	8.369	8.124	7.139
0.483870967741936			8.543	8.54	8.507	8.338	8.111	6.577
0.516129032258065			8.345	8.344	8.343	8.281	7.913	6.536
0.548387096774194			8.089	8.04	7.922	7.744	7.731	6.214
0.580645161290323			7.636	7.589	7.481	7.327	7.289	6.062
0.612903225806452			7.615	7.568	7.454	7.271	7.1	5.952
0.645161290322581			7.552	7.508	7.413	7.233	6.862	5.859
0.67741935483871 6.716			6.716	6.715	6.711	6.624	5.598	
0.709677419354839			6.421	6.376	6.295	6.286	6.215	5.574
0.741935483870968			6.298	6.298	6.271	6.117	6.016	4.974
0.774193548387097			5.968	5.932	5.85	5.794	5.708	4.955
0.806451612903226			5.718	5.688	5.565	5.558	5.486	4.53
0.838709677419355			5.594	5.561	5.484	5.38	5.314	4.38

0.870967741935484	5.422	5.383	5.281	5.123	5.023	3.988
0.903225806451613	5.037	5.014	4.921	4.805	4.746	3.902
0.935483870967742	4.83	4.811	4.809	4.713	4.561	3.57
0.967741935483871	3.891	3.891	3.891	3.829	3.725	2.183

0.1	18.199	18.116	17.783	17.038	16.484	12.91
Average of yearly averages: 7.53613333333333						

Inputs generated by pe5.pl - November 2006

Data used for this run:

Output File: PAtur28h6

Metfile: w14751.dvf

PRZM scenario: PAturfSTD.txt

EXAMS environment file: pond298.exv

Chemical Name: Flurprimidol

Description	Variable Name	Value	Units	Comments
Molecular weight	mwt	312.3	g/mol	
Henry's Law Const.	henry	3.97e-09	atm-m ³ /mol	
Vapor Pressure	vapr	3.64e-07	torr	
Solubility	sol	130	mg/L	
Kd	Kd	2.78	mg/L	
Koc	Koc		mg/L	
Photolysis half-life	kdp	1.4	days	Half-life
Aerobic Aquatic Metabolism	kbacw	0	days	Halfife
Anaerobic Aquatic Metabolism	kbacs	0	days	Halfife
Aerobic Soil Metabolism	asm	1444	days	Halfife
Hydrolysis:	pH 7	0	days	Half-life
Method:	CAM 2	integer		See PRZM manual
Incorporation Depth:	DEPI	0	cm	
Application Rate:	TAPP	0.291	kg/ha	
Application Efficiency:	APPEFF	0.99	fraction	
Spray Drift	DRFT	0.01		fraction of application rate applied to pond
Application Date	Date	5-6	dd/mm or dd/mm/yy or dd-mm or dd-mm/yy	
Interval 1 interval	14	days		Set to 0 or delete line for single app.
app. rate 1	apprate	0.291	kg/ha	
Interval 2 interval	14	days		Set to 0 or delete line for single app.
app. rate 2	apprate	0.291	kg/ha	
Interval 3 interval	14	days		Set to 0 or delete line for single app.
app. rate 3	apprate	0.291	kg/ha	
Interval 4 interval	14	days		Set to 0 or delete line for single app.
app. rate 4	apprate	0.291	kg/ha	
Interval 5 interval	14	days		Set to 0 or delete line for single app.
app. rate 5	apprate	0.291	kg/ha	
Interval 6 interval	14	days		Set to 0 or delete line for single app.
app. rate 6	apprate	0.291	kg/ha	
Interval 7 interval	14	days		Set to 0 or delete line for single app.
app. rate 7	apprate	0.291	kg/ha	
Interval 8 interval	14	days		Set to 0 or delete line for single app.
app. rate 8	apprate	0.291	kg/ha	
Interval 9 interval	14	days		Set to 0 or delete line for single app.
app. rate 9	apprate	0.291	kg/ha	
Interval 10 interval	14	days		Set to 0 or delete line for single app.
app. rate 10	apprate	0.291	kg/ha	
Interval 11 interval	14	days		Set to 0 or delete line for single app.
app. rate 11	apprate	0.160	kg/ha	

Record 17: FILTRA
 IPSCND 1
 UPTKF
 Record 18: PLVKRT
 PLDKRT
 FEXTRC 0.5

Flag for Index Res. Run
Flag for runoff calc.

IR EPA Pond
RUNOFFnone none, monthly or total(average of entire run)

APPENDIX C: T-REX EECs

RESULTS– Upper Bound EECs and RQs for 4 Applications at 0.75 lb ai/A with a 14-day Interval

Upper Bound Kenaga Residues For RQ Calculation	
Chemical Name:	Flurprimidol
Use:	Turf Grass / Ornamentals
Formulation:	Cutless 50W Turf Growth Regulator
Application Rate:	0.75 lbs ai/A
Half-life:	35 days
Application Interval:	14 days
Maximum # Apps./Year:	4 applications
Length of Simulation:	1 year

Endpoints			
Avian	Bobwhite quail	LD50 (mg/kg-bw)	>2000
	Bobwhite quail	LC50 (mg/kg-diet)	>4310
	Mallard duck	NOAEL (mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	309
Mammals		LD50 (mg/kg-bw)	709
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	7.3
		NOAEC (mg/kg-diet)	100

Dietary-Based EECs		
Food Items	Upper Bound EEC (mg ai/kg)	Mean EEC (mg ai/kg)
Short Grass	498.15	176.43
Tall Grass	228.32	74.72
Sm. Insects, Broadleaf Plants	280.21	93.4
Lg. Insects, Fruits, Pods	31.13	14.5

AVIAN EECs and ADJUSTED LD50s

Avian Class	Body Weight (g)	Ingestion (Fdry) (g bw/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Small	20	5	23	114	2.28E-02
Mid	100	13	65	65	6.49E-02
Large	1000	58	291	29	2.91E-01

Avian Body Weight (g)	Adjusted LD50 (mg/kg-bw)
20	>1440.86
100	>1834.29
1000	>2591

Dose-based EECs (mg/kg-bw)			
Food items	Avian Classes and Body Weights		
	small	mid	large
	20 g	100 g	1000 g
Upper Bound EEC (mg/kg)			
Short Grass	567.34	323.52	144.84
Tall Grass	260.03	148.28	66.39
Sm. Insects, Broadleaf Plants	319.13	181.98	81.48
Lg. Insects, Fruits, Pods	35.46	20.22	9.05
Mean EEC (mg/kg)			
Short Grass	200.93	114.58	51.30
Tall Grass	85.10	48.53	21.73
Sm. Insects, Broadleaf Plants	106.38	60.66	27.16
Lg. Insects, Fruits, Pods	16.55	9.44	4.22

MAMMALIAN EECs and ADJUSTED LD50s

Mammalian Class	Body Weight	Ingestion (Fdry) (g bwt/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Herbivores/ insectivores	15	3	14	95	1.43E-02
	35	5	23	66	2.31E-02
	1000	31	153	15	1.53E-01
Granivores	15	3	3	21	3.18E-03
	35	5	5	15	5.13E-03
	1000	31	34	3	3.40E-02

Mammalian Class	Body Weight	Adjusted LD50	Adjusted NOAEL
Herbivores/ insectivores	15	1558.26	16.04
	35	1260.80	12.98
	1000	545.33	5.61
Granivores	15	1558.26	16.04
	35	1260.80	12.98
	1000	545.33	5.61

Dose-based EECs (mg/kg-bw)	Mammalian Classes and Body Weight					
	Herbivores and Insectivores			Granivores		
	15 g	35 g	1000 g	15 g	35 g	1000 g
Upper Bound EECs (mg ai/kg)						
Short Grass	474.94	328.25	76.11			
Tall Grass	217.68	150.45	34.88			
Broadleaf plants and small insects	267.16	184.64	42.81			
Fruits/pods/seeds/large insects	29.68	20.52	4.76	6.60	4.56	1.06
Mean EECs (mg ai/kg)						
Short Grass	168.21	116.26	26.95			
Tall Grass	71.24	49.24	11.42			
Broadleaf plants and small insects	89.05	61.55	14.27			
Fruits/pods/seeds/large insects	13.85	9.57	2.22	3.08	2.13	0.49

Table C1. Upper Bound Kenaga, Acute Avian Dose-Based Risk Quotients (4 Applications @ 0.75 lb ai/A with 14 Day Intervals)									
Size Class (grams)	Adjusted LD50	EECs and RQs							
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
20	>1440.86	567.34	N/A	260.03	N/A	319.13	N/A	35.46	N/A
100	>1834.29	323.52	N/A	148.28	N/A	181.98	N/A	20.22	N/A
1000	>2591.00	144.84	N/A	66.39	N/A	81.48	N/A	9.05	N/A

-Bold value indicates LOC exceedance

-N/A – Acute toxicity threshold was greater than the highest dose tested; risk is expected to be minimal; thus, RQs were not calculated

Table C2. Upper Bound Kenaga, Subacute Avian Dietary Based Risk Quotients (4 Applications @ 0.75 lb ai/A with 14 Day Intervals)								
LC50	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
>4310	498.15	N/A	228.32	N/A	280.21	N/A	31.13	N/A

-Size class not used for dietary risk quotients

-Bold value indicates LOC exceedance

-N/A – Acute toxicity threshold was greater than the highest dose tested; risk is expected to be minimal; thus, RQs were not calculated

Table C3. Upper Bound Kenaga, Chronic Avian Dietary Based Risk Quotients (4 Applications @ 0.75 lb ai/A with 14 Day Intervals)								
NOAEC (mg/kg-diet)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
309	498.15	1.61	228.32	0.74	280.21	0.91	31.13	0.10

Size class not used for dietary risk quotients

Bold values indicate LOC exceedances

Table C4. Upper Bound Kenaga, Acute Mammalian Dose-Based Risk Quotients (4 Applications @ 0.75 lb ai/A with 14 Day Intervals)											
Size Class (grams)	Adjusted LD50	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivores	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	1558.26	474.94	0.30	217.68	0.14	267.16	0.17	29.68	0.02	6.60	0.00
35	1260.80	328.25	0.26	150.45	0.12	184.64	0.15	20.52	0.02	4.56	0.00
1000	545.33	76.11	0.14	34.88	0.06	42.81	0.08	4.76	0.01	1.06	0.00

Table C5. Upper Bound Kenaga, Chronic Mammalian Dietary Based Risk Quotients (4 Applications @ 0.75 lb ai/A with 14 Day Intervals)								
NOAEC (mg/kg-diet)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
100	498.15	4.98	228.32	2.28	280.21	2.80	31.13	0.31

Size class not used for dietary risk quotients

Table C6. Upper Bound Kenaga, Chronic Mammalian Dose-Based Risk Quotients (4 Applications @ 0.75 lb ai/A with 14 Day Intervals)											
Size Class (grams)	Adjusted NOAEL	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivores	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	16.04	474.94	29.60	217.68	13.57	267.16	16.65	29.68	1.85	6.60	0.41
35	12.98	328.25	25.29	150.45	11.59	184.64	14.22	20.52	1.58	4.56	0.35
1000	5.61	76.11	13.55	34.88	6.21	42.81	7.62	4.76	0.85	1.06	0.19

Bold values indicate LOC exceedances

Mean EECs and RQs for 4 Applications at 0.75 lb ai/A with a 14-day Interval

Table C7. Mean Kenaga, Acute Avian Dose-Based Risk Quotients (4 Applications @ 0.75 lb ai/A with 14 Day Intervals)									
Size Class (grams)	Adjusted LD50	EECs and RQs							
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
20	>1440.86	200.93	N/A	85.10	N/A	106.38	N/A	16.55	N/A
100	>1834.29	114.58	N/A	48.53	N/A	60.66	N/A	9.44	N/A
1000	>2591.00	51.30	N/A	21.73	N/A	27.16	N/A	4.22	N/A

N/A – Acute toxicity threshold was greater than the highest dose tested; risk is expected to be minimal; thus, RQs were not calculated

Table C8. Mean Kenaga, Subacute Avian Dietary Based Risk Quotients (4 Applications @ 0.75 lb ai/A with 14 Day Intervals)								
LC50	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
>4310	176.43	N/A	74.72	N/A	93.40	N/A	14.53	N/A

Size class not used for dietary risk quotients

Table C9. Mean Kenaga, Chronic Avian Dietary Based Risk Quotients (4 Applications @ 0.75 lb ai/A with 14 Day Intervals)								
NOAEC (mg/kg-diet)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
309	176.43	0.571	74.72	0.242	93.40	0.302	14.53	0.047

Size class not used for dietary risk quotients

Bold value indicates LOC exceedance

Table C10. Mean Kenaga, Acute Mammalian Dose-Based Risk Quotients (4 Applications @ 0.75 lb ai/A with 14 Day Intervals)											
Size Class (grams)	Adjusted LD50	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivores	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	1558.26	168.21	0.108	71.24	0.046	89.05	0.057	13.85	0.009	3.08	0.00
35	1260.80	116.26	0.092	49.24	0.039	61.55	0.049	9.57	0.008	2.13	0.00
1000	545.33	26.95	0.049	11.42	0.021	14.27	0.026	2.22	0.004	0.49	0.00

Table C11. Mean Kenaga, Chronic Mammalian Dietary Based Risk Quotients (4 Applications @ 0.75 lb ai/A with 14 Day Intervals)								
NOAEC (mg/kg-diet)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
100	176.43	1.764	74.72	0.747	93.40	0.934	14.53	0.145

Size class not used for dietary risk quotients

Table C12. Mean Kenaga, Chronic Mammalian Dose-Based Risk Quotients (4 Applications @ 0.75 lb ai/A with 14 Day Intervals)											
Size Class (grams)	Adjusted NOAEL	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivores	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	16.04	168.21	10.484	71.24	4.440	89.05	5.550	13.85	0.863	3.08	0.19
35	12.98	116.26	8.956	49.24	3.793	61.55	4.741	9.57	0.738	2.13	0.16
1000	5.61	26.95	4.801	11.42	2.033	14.27	2.541	2.22	0.395	0.49	0.09

RESULTS– Upper Bound EECs and RQs for 12 Applications at 0.26 lb ai/A with a 14-day Interval

Upper Bound Kenaga Residues For RQ Calculation	
Chemical Name:	Flurprimidol
Use:	Turf Grass / Ornamentals
Formulation:	Cutless 50W Turf Growth Regulator
Application Rate:	0.26 lbs ai/A
Half-life:	35 days
Application Interval:	14 days
Maximum # Apps./Year:	12 applications
Length of Simulation:	1 year

Endpoints			
Avian	Bobwhite quail	LD50 (mg/kg-bw)	>2000
	Bobwhite quail	LC50 (mg/kg-diet)	>4310
	Mallard duck	NOAEL (mg/kg-bw)	0.00
	Mallard duck	NOAEC (mg/kg-diet)	309
Mammals		LD50 (mg/kg-bw)	709
		LC50 (mg/kg-diet)	0.00
		NOAEL (mg/kg-bw)	7.3
		NOAEC (mg/kg-diet)	100

Dietary-Based EECs		
Food Items	Upper Bound EEC (mg ai/kg)	Mean EEC (mg ai/kg)
Short Grass	248.45	87.99
Tall Grass	113.87	37.27
Sm. Insects, Broadleaf Plants	139.75	46.58
Lg. Insects, Fruits, Pods	15.53	7.25

AVIAN EECs and ADJUSTED LD50s

Avian Class	Body Weight (g)	Ingestion (Fdry) (g bw/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Small	20	5	23	114	2.28E-02
Mid	100	13	65	65	6.49E-02
Large	1000	58	291	29	2.91E-01

Avian Body Weight (g)	Adjusted LD50 (mg/kg-bw)
20	>1440.86

100	>1834.29
1000	>2591

Dose-based EECs (mg/kg-bw)			
Food Items	Avian Classes and Body Weights		
	small	mid	large
	20 g	100 g	1000 g
Upper Bound EEC (mg/kg)			
Short Grass	282.96	161.36	72.24
Tall Grass	129.69	73.95	33.11
Sm. Insects, Broadleaf Plants	159.16	90.76	40.64
Lg. Insects, Fruits, Pods	17.68	10.08	4.52
Mean EEC (mg/kg)			
Short Grass	100.21	57.15	25.59
Tall Grass	42.44	24.20	10.84
Sm. Insects, Broadleaf Plants	53.05	30.25	13.55
Lg. Insects, Fruits, Pods	8.25	4.71	2.11

MAMMALIAN EECs and ADJUSTED LD50s

Mammalian Class	Body Weight	Ingestion (Fdry) (g bwt/day)	Ingestion (Fwet) (g/day)	% body wgt consumed	FI (kg-diet/day)
Herbivores/ Insectivores	15	3	14	95	1.43E-02
	35	5	23	66	2.31E-02
	1000	31	153	15	1.53E-01
Granivores	15	3	3	21	3.18E-03
	35	5	5	15	5.13E-03
	1000	31	34	3	3.40E-02

Mammalian Class	Body Weight	Adjusted LD50	Adjusted NOAEL
Herbivores/ insectivores	15	1558.26	16.04
	35	1260.80	12.98
	1000	545.33	5.61
Granivores	15	1558.26	16.04
	35	1260.80	12.98
	1000	545.33	5.61

Dose-based EECs (mg/kg-bw)	Mammalian Classes and Body Weight					
	Herbivores and Insectivores			Granivores		
	15 g	35 g	1000 g	15 g	35 g	1000 g
Upper Bound EECs (mg ai/kg)						
Short Grass	236.88	163.71	37.96			
Tall Grass	108.57	75.04	17.40			
Broadleaf plants and small insects	133.24	92.09	21.35			
Fruits/pods/seeds/large insects	14.80	10.23	2.37	3.29	2.27	0.53
Mean EECs (mg ai/kg)						
Short Grass	83.89	57.98	13.44			
Tall Grass	35.53	24.56	5.69			
Broadleaf plants and small insects	44.41	30.70	7.12			
Fruits/pods/seeds/large insects	6.91	4.77	1.11	1.54	1.06	0.25

Table C13. Upper Bound Kenaga, Acute Avian Dose-Based Risk Quotients (12 Applications @ 0.26 lb ai/A with 14 Day Intervals)									
Size Class (grams)	Adjusted LD50	EECs and RQs							
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
20	>1440.86	282.96	N/A	129.69	N/A	159.16	N/A	17.68	N/A
100	>1834.29	161.36	N/A	73.95	N/A	90.76	N/A	10.08	N/A
1000	>2591.00	72.24	N/A	33.11	N/A	40.64	N/A	4.52	N/A

-Bold value indicates LOC exceedance

-N/A – Acute toxicity threshold was greater than the highest dose tested; risk is expected to be minimal; thus, RQs were not calculated

Table C14. Upper Bound Kenaga, Subacute Avian Dietary Based Risk Quotients (12 Applications @ 0.26 lb ai/A with 14 Day Intervals)								
LC50	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
>4310	248.45	N/A	113.87	N/A	139.75	N/A	15.53	N/A

-Size class not used for dietary risk quotients

-Bold value indicates LOC exceedance

-N/A – Acute toxicity threshold was greater than the highest dose tested; risk is expected to be minimal; thus, RQs were not calculated

Table C15. Upper Bound Kenaga, Chronic Avian Dietary Based Risk Quotients (12 Applications @ 0.26 lb ai/A with 14 Day Intervals)								
NOAEC (mg/kg-diet)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
309	248.45	0.80	113.87	0.37	139.75	0.45	15.53	0.05

Size class not used for dietary risk quotients

Bold values indicate LOC exceedances

Table C16. Upper Bound Kenaga, Acute Mammalian Dose-Based Risk Quotients (12 Applications @ 0.26 lb ai/A with 14 Day Intervals)											
Size Class (grams)	Adjusted LD50	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivores	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	1558.26	236.88	0.15	108.57	0.07	133.24	0.09	14.80	0.01	3.29	0.00
35	1260.80	163.71	0.13	75.04	0.06	92.09	0.07	10.23	0.01	2.27	0.00
1000	545.33	37.96	0.07	17.40	0.03	21.35	0.04	2.37	0.00	0.53	0.00

Table C17. Upper Bound Kenaga, Chronic Mammalian Dietary Based Risk Quotients (12 Applications @ 0.26 lb ai/A with 14 Day Intervals)								
NOAEC (mg/kg-diet)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
100	248.45	2.48	113.87	1.14	139.75	1.40	15.53	0.16

Size class not used for dietary risk quotients

Table C18. Upper Bound Kenaga, Chronic Mammalian Dose-Based Risk Quotients (12 Applications @ 0.26 lb ai/A with 14 Day Intervals)											
Size Class (grams)	Adjusted NOAEL	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivores	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	16.04	236.88	14.76	108.57	6.77	133.24	8.30	14.80	0.92	3.29	0.21
35	12.98	163.71	12.61	75.04	5.78	92.09	7.09	10.23	0.79	2.27	0.18
1000	5.61	37.96	6.76	17.40	3.10	21.35	3.80	2.37	0.42	0.53	0.09

Bold values indicate LOC exceedances

Mean EECs and RQs for 12 Applications at 0.26 lb ai/A with a 14-day Interval

Table C19. Mean Kenaga, Acute Avian Dose-Based Risk Quotients (12 Applications @ 0.26 lb ai/A with 14 Day Intervals)									
Size Class (grams)	Adjusted LD50	EECs and RQs							
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
20	>1440.86	100.21	N/A	42.44	N/A	53.05	N/A	8.25	N/A
100	>1834.29	57.15	N/A	24.20	N/A	30.25	N/A	4.71	N/A
1000	>2591.00	25.59	N/A	10.84	N/A	13.55	N/A	2.11	N/A

N/A – Acute toxicity threshold was greater than the highest dose tested; risk is expected to be minimal; thus, RQs were not calculated

Table C20. Mean Kenaga, Subacute Avian Dietary Based Risk Quotients (12 Applications @ 0.26 lb ai/A with 14 Day Intervals)								
LC50	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
>4310	87.99	N/A	37.27	N/A	46.58	N/A	7.25	N/A

Size class not used for dietary risk quotients

Table C21. Mean Kenaga, Chronic Avian Dietary Based Risk Quotients (12 Applications @ 0.26 lb ai/A with 14 Day Intervals)								
NOAEC (mg/kg-diet)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
309	87.99	0.285	37.27	0.121	46.58	0.151	7.25	0.023

Size class not used for dietary risk quotients

Bold value indicates LOC exceedance

Table C22. Mean Kenaga, Acute Mammalian Dose-Based Risk Quotients (12 Applications @ 0.26 lb ai/A with 14 Day Intervals)											
Size Class (grams)	Adjusted LD50	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivores	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	1558.26	83.89	0.054	35.53	0.023	44.41	0.029	6.91	0.004	1.54	0.00
35	1260.80	57.98	0.046	24.56	0.019	30.70	0.024	4.77	0.004	1.06	0.00
1000	545.33	13.44	0.025	5.69	0.010	7.12	0.013	1.11	0.002	0.25	0.00

Table C23. Mean Kenaga, Chronic Mammalian Dietary Based Risk Quotients (12 Applications @ 0.26 lb ai/A with 14 Day Intervals)								
NOAEC (mg/kg-diet)	EECs and RQs							
	Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects	
	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
100	87.99	0.880	37.27	0.373	46.58	0.466	7.25	0.072

Size class not used for dietary risk quotients

Table C24. Mean Kenaga, Chronic Mammalian Dose-Based Risk Quotients (12 Applications @ 0.26 lb ai/A with 14 Day Intervals)											
Size Class (grams)	Adjusted NOAEL	EECs and RQs									
		Short Grass		Tall Grass		Broadleaf Plants/ Small Insects		Fruits/Pods/ Seeds/ Large Insects		Granivores	
		EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ	EEC	RQ
15	16.04	83.89	5.229	35.53	2.215	44.41	2.768	6.91	0.431	1.54	0.10
35	12.98	57.98	4.467	24.56	1.892	30.70	2.365	4.77	0.368	1.06	0.08
1000	5.61	13.44	2.394	5.69	1.014	7.12	1.268	1.11	0.197	0.25	0.04

RESULTS– Intermediate EECs and LD50/SQ FT for 1 Banded Spray Application at 0.69 lb ai/A

INPUTS – LD50/SQ FT Calculations		
Application Rate:	0.69	lbs / acre
% A.I.:	100.00%	
Avian LD50 (20g):	>1440.86	mg/kg bw
(100g)	>1834.29	
(1000g)	>2591.00	
Mammalian LD50		
(15g):	1558.26	mg/kg bw
(35g)	1260.80	
(1000g)	545.33	
Row Spacing:	0	inches
Bandwidth:	0	inches
Unincorporation:	100%	

Broadcast applications		
Liquid		
Intermediate Calculations		
	mg ai/ft2:	7.18
LD50 ft-2		
wgt class (grams)		
Avian	20	N/A
	100	N/A
	1000	N/A
Mammal	15	0.31
	35	0.16
	1000	0.01

RESULTS– Intermediate EECs and LD50/SQ FT for 1 Application of Granules at 0.75 lb a.i./A

INPUTS – LD50/SQ FT Calculations		
Application Rate:	0.75	lbs/ acre
% A.I.:	100.00%	
Avian LD50 (20g):	>1440.86	mg/kg bw
(100g)	>1834.29	
(1000g)	>2591.00	
Mammalian LD50		
(15g):	1558.26	mg/kg bw
(35g)	1260.80	
(1000g)	545.33	
Row Spacing:	0	inches
Bandwidth:	0	inches
Unincorporation:	100%	

Broadcast applications		
Granular		
Intermediate Calculations		
mg ai/ft2:		7.81
LD50 ft-2		
wgt class (grams)		
Avian	20	N/A
	100	N/A
	1000	N/A
Mammal	15	0.33
	35	0.18
	1000	0.01

RESULTS– Intermediate EECs and LD50/SQ FT for 1 Application of Granules at 3.0 lb a.i./A

INPUTS – LD50/SQ FT Calculations		
Application Rate:	3.0	lbs / acre
% A.I.:	100.00%	
Avian LD50 (20g):	>1440.86	mg/kg bw
(100g)	>1834.29	
(1000g)	>2591.00	
Mammalian LD50		
(15g):	1558.26	mg/kg bw
(35g)	1260.80	
(1000g)	545.33	
Row Spacing:	0	inches
Bandwidth:	0	inches
Unincorporation:	100%	

Broadcast applications		
Granular		
Intermediate Calculations		
	mg ai/ft2:	31.24
LD50 ft-2		
	wgt class (grams)	
Avian	20	N/A
	100	N/A
	1000	N/A
Mammal	15	1.34
	35	0.71
	1000	0.06

RESULTS– Intermediate EECs and LD50/SQ FT for 1 Banded Application of Granules at 1.5 lb a.i./A

INPUTS – LD50/SQ FT Calculations		
Application Rate:	1.5	lbs / acre
% A.I.:	100.00%	
Avian LD50 (20g):	>1440.86	mg/kg bw
(100g)	>1834.29	
(1000g)	>2591.00	
Mammalian LD50		
(15g):	1558.26	mg/kg bw
(35g)	1260.80	
(1000g)	545.33	
Row Spacing:	0	inches
Bandwidth:	0	inches
Unincorporation:	100%	

Broadcast applications		
Granular		
Intermediate Calculations		
mg ai/ft ² :		15.62
LD50 ft-2		
wgt class (grams)		
Avian	20	N/A
	100	N/A
	1000	N/A
Mammal	15	0.67
	35	0.35
	1000	0.03

APPENDIX D: Terrestrial Chronic Exposure Estimates for Granular Applications of Flurprimidol (Earthworm Fugacity Model)

Flurprimidol exposure to terrestrial wildlife from non-granular applications is evaluated by estimating pesticide residues on food items including grasses, plants, insects, fruits, pods, and seeds. For granular applications, terrestrial EECs and acute risks were derived based on an estimation of loadings of pesticide per unit area (ft^2). EFED has no standard methodology for assessing chronic risk to terrestrial animals from granular applications. The following chronic exposure estimation and risk characterization for terrestrial animals considers granular routes of exposure including direct ingestion of soil invertebrates that have bioconcentrated pesticide residues of granules in soil.

Direct Ingestion of Soil Invertebrates

An estimation of flurprimidol concentrations potentially accumulated in the tissues of earthworms was required to complete the exposure estimates for insectivorous birds and mammals. This estimation of earthworm concentration was calculated using a fugacity-based (equilibrium partitioning) approach based on the work of Trapp and McFarlane (1995) and Mackay and Paterson (1981). Earthworms dwelling within the soil are exposed to contaminants in both soil pore water and via the ingestion of soil (Belfroid et al. 1994). The concentration of flurprimidol in earthworms was calculated as a combination of uptake from soil pore water and gastrointestinal absorption from ingested soil:

$$C_{\text{earthworm}} = [(C_{\text{soil}})(Z_{\text{earthworm}}/Z_{\text{soil}})] + [(C_{\text{soil water}})(Z_{\text{earthworm}}/Z_{\text{water}})]$$

where:

C_{soil} is the concentration of chemical in bulk soil (note: a chemical concentration averaged over a 15-cm soil depth was used to reflect a concentration across the earthworm occupied area of soil)

$Z_{\text{earthworm}}$ is the fugacity capacity of chemical in earthworms = $(\text{lipid})(K_{\text{ow}})(\rho_{\text{earthworm}})/H$

Z_{soil} is the fugacity capacity of chemical in soil = $(K_d)(\rho_{\text{soil}})/H$

Z_{water} is the fugacity capacity of chemical in water = $1/H$

$C_{\text{soil water}}$ is the concentration of chemical in soil water = $C_{\text{soil}}/K_{\text{bw}}$

K_{bw} is the bulk soil-to-water partitioning coefficient = $(\rho_{\text{soil}})(K_d) + \theta + (\varepsilon - \theta)(K_{\text{aw}})$

K_{aw} is the air-to-water partitioning coefficient = H/RT

H = Henry's Constant specific to flurprimidol ($1.17\text{E-}4$)

R = universal gas constant, $8.31 \text{ Joules-m}^3/\text{mol-}^\circ\text{K}$

T = temperature $^\circ\text{K}$, assumed to be $298 \text{ }^\circ\text{K}$

K_d = soil partitioning coefficient for flurprimidol (2.8)

ρ_{soil} = bulk density of soil, assumed to be 1.3 g/cm^3

θ = volumetric fraction of the soil, assumed to be 0.30

ε = volumetric total porosity of the soil, assumed to 0.50

lipid = fraction of lipid in organism 0.01 (Cobb et al., 1995)

K_{ow} = the octanol to water partitioning coefficient for flurprimidol (2.96)

$\rho_{\text{earthworm}}$ = the density of the organism, assumed to be 1 g/cm³

Table D.1 summarizes the estimated immediate post-treatment soil concentrations of flurprimidol, assuming 15 cm (3-inch) averaging depth, a soil density of 1.3 g/cm³, and granular application rates of flurprimidol at 3.0 lb ai/A.

Table D.1 - Estimated Soil Concentrations for Flurprimidol (Immediately Post-treatment)	
Application Rate (lb ai/A)	Soil Concentration (mg/kg-soil) ca 15 cm
3.0	0.00718

Table D.2 summarizes the model inputs and exposure estimates (i.e., earthworm concentrations in ppm) for insectivorous birds and mammals, based on granular flurprimidol application rate of 3.0 lb ai/A.

Table D.2 - Model Input Parameters and Dietary Exposure Estimates for Avian and Mammalian Receptors (for Soil Concentrations Immediately Post-treatment)	
Parameter	3.0 lb ai/A
C_s (mg/kg @ 15 cm depth)	0.00718
Earthworm Concentration (mg/kg) ($C_{\text{earthworm}}$)	0.0351
K_d (cm ³ /g)	2.8
ρ_{soil} (g/cm ³)	1.3
$\rho_{\text{earthworm}}$ (g/cm ³)	1
θ (unitless)	0.3
ϵ (unitless)	0.5
K_{aw} (H/RT)	4.7E-08
K_{bw} ($((\rho_{\text{soil}} \cdot K_d) + \theta + (\epsilon - \theta)(K_{aw}))$)	3.94

Chronic Risk Characterization for Terrestrial Wildlife

Chronic risks for birds and mammals that consume terrestrial invertebrates as the majority of their diet were estimated based on comparison of the concentration of flurprimidol in earthworm tissue ($C_{\text{earthworm}}$) with chronic toxicity values for birds and mammals. Given that earthworms are likely to be present in the top 6 inches of soil, a 15-cm soil depth was used to reflect a

concentration across the earthworm occupied area of soil to derive the $C_{\text{earthworm}}$. It is important to note that this estimation of risk assumes that 100% of the diet is comprised of terrestrial soil invertebrates.

Insectivorous Birds

Chronic risks for insectivorous birds were estimated by comparing the $C_{\text{earthworm}}$ in mg/kg by the avian chronic NOAEC for flurprimidol (309 mg/kg). Estimated earthworm residues for insectivorous avian receptors (0.04 mg/kg) are less than the avian chronic endpoint (309 mg/kg; based on reproductive effects) for granular flurprimidol application of 3.0 lb ai/A. Therefore, chronic risks to insectivorous birds associated with ingestion of terrestrial invertebrates (i.e., earthworms) that have bioaccumulated flurprimidol granules are not expected. However, it is unclear whether other routes of granular flurprimidol exposure (i.e., direct consumption of granules, ingestion of granules that adhere to soil invertebrates, partitioning of dissolved flurprimidol to on-site sources of wildlife drinking water, dermal exposure of granules released to surrounding soil, and on-site puddles) or combined routes of exposure would result in chronic risk concerns for terrestrial-phase amphibians.

Insectivorous Mammals

Chronic risks for insectivorous mammals were estimated by considering both dietary- and dose-related exposures and effects. In the dietary method, risks were estimated by comparing the $C_{\text{earthworm}}$ by the mammalian chronic NOAEC for flurprimidol (100 mg/kg; based on reduction in body weight gain). In the dose method, the residue concentration in earthworms was converted to a daily oral dose based on the fraction of body weight consumed as estimated through mammalian allometric relationships. The dose was then compared to the NOAEL (7.3 mg/kg-BW/day) for mammalian receptors.

Based on the dietary method and flurprimidol granular application rates of 3.0 lb ai/A, chronic LOCs are not exceeded for insectivorous mammals because the respective earthworm residue concentrations (0.04 mg/kg) are less than the NOAEC (100 mg/kg). Earthworm residue concentrations derived based on the dose method are first converted to a daily dose by multiplying the dietary $C_{\text{earthworm}}$ by the percentage BW consumed for the small mammals (15g = 95% BW). In addition, the NOAEL value (7.3 mg/kg-BW/day) is adjusted to account for the size of the mammals according to the following equation:

$$\text{Adjusted NOAEL} = \text{NOAEL} (TW/AW)^{(0.25)}$$

where:

TW = body weight of tested animal (350 g rat); and
AW = body weight of assessed animal (15 g).

As shown in **Table D.3**, estimated chronic doses for insectivorous mammals, based on the granular application of flurprimidol (3.0 lb ai/A) and adjusted NOAELs for small sized mammals does not exceed chronic LOC with a RQ of <0.1. The results of the assessment indicate that,

when growth effect risks for mammals are assessed on the basis of daily ingested dietary dose, the accumulation of flurprimidol in terrestrial invertebrates may represent, by itself, a biologically significant pathway for exposure. Dose-based RQs are likely to provide more accurate estimates of risk to insectivorous mammals because they are based on earthworm residues that are consumed by a mammal in a given day and adjusted NOAEL values for three sizes of mammals, while the dietary-based RQs use no such adjustments to account for feeding behavior and varying size classes.

Table D.3. Dose-based Chronic RQ for Insectivorous Mammals

Application Rate	Body Weight (g)	Dose-adjusted EEC _w (mg/kg-BW/day) ^a	Adjusted NOAEL (mg/kg-BW/day) ^b	Chronic RQ ^c
3.0 lb ai/A	15	0.03	16.04	<0.1

^a Dose-adjusted EEC_w = Dietary EEC_w (ppm) • (%BW consumed/100).

^b Adjusted NOAEL = NOAEL (TW/AW)^{0.25}.

^c Chronic RQ = Dose-adjusted EEC_w / Adjusted NOAEL.

* Exceeds chronic risk level of concern (RQ ≥ 1.0).

Uncertainties

There are a number of uncertainties associated with the fugacity model used to estimate flurprimidol concentrations in earthworm tissue and subsequent risks to insectivorous terrestrial animals. It may be possible to further refine this assessment with additional information addressing the following uncertainties:

- A flurprimidol concentration averaged over a 15-cm soil depth was used to reflect a concentration across the earthworm occupied area of soil. However, it is possible that earthworms may be present at deeper soil depths, resulting in a lower concentration of flurprimidol in bulk soil and earthworm tissue.

- The fugacity-based model assumes equilibrium partitioning between bulk soil and soil pore water. In addition, the model assumes a fixed value for soil density, earthworm density, temperature, pore space, organic carbon, and the lipid content of the earthworm. Resulting concentrations of flurprimidol in earthworm tissue may be either under- or over-estimated depending on the soil type, temperature, and size/lipid content of the earthworm, at the time of exposure. This assessment considers only one route of exposure (i.e., ingestion of terrestrial invertebrates that have bioaccumulated flurprimidol from granules in the soil) for insectivorous birds and mammals. In addition, it is assumed that 100% of the diet is comprised of terrestrial soil invertebrates. Given species-specific feeding habits and dietary requirements, this assumption may overestimate risks associated with ingestion of soil invertebrates that have accumulated flurprimidol, especially for terrestrial-phase amphibians, which have lower metabolic rates than birds. Other potential routes of exposure including direct ingestion of granules, ingestion of granules that adhere to soil invertebrates, partitioning of dissolved flurprimidol to sources of wildlife drinking water, and dermal exposure of granules released to surrounding soil and puddles) or combined routes of exposure were not considered.

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APPENDIX E: TERRPLANT EECs

1. Spray Application of 0.26 lbs ai/A to Turf grass / Ornamentals

Table E1. Chemical Identity.	
Chemical Name	flurprimidol
PC code	125701
Use	Turf / Ornamental
Application Method	Ground
Application Form	liquid
Solubility in Water (ppm)	130 mg/L

Table E2. Input parameters used to derive EECs.			
Input Parameter	Symbol	Value	Units
Application Rate	A	0.26	lbs ai/A
Incorporation	I	1	none
Runoff Fraction	R	0.05	none
Drift Fraction	D	0.01	none

Table E3. EECs for Flurprimidol. Units in lbs ai/A.		
Description	Equation	EEC
Runoff to dry areas	$(A/I)*R$	0.013
Runoff to semi-aquatic areas	$(A/I)*R*10$	0.13
Spray drift	$A*D$	0.0026
Total for dry areas	$((A/I)*R)+(A*D)$	0.0156
Total for semi-aquatic areas	$((A/I)*R*10)+(A*D)$	0.1326

Table E4. Plant survival and growth data used for RQ derivation. Units are in lbs ai/A.				
Plant type	Seedling Emergence		Vegetative Vigor	
	EC25	NOAEC	EC25	NOAEC
Monocot	0.14	0.038	0.42	0.11
Dicot	0.012	0.0044	0.011	0.0046

Table E5. RQ values for plants in dry and semi-aquatic areas exposed to Flurprimidol through runoff and/or spray drift.*				
Plant Type	Listed Status	Dry	Semi-Aquatic	Spray Drift
Monocot	non-listed	0.11	0.95	<0.1
Monocot	listed	0.41	3.49	<0.1
Dicot	non-listed	1.30	11.05	0.24
Dicot	listed	3.55	30.14	0.57

*If RQ > 1.0, the LOC is exceeded, resulting in potential for risk to that plant group.
INC - inconclusive

2. Spray Application of 0.75 lbs ai/A to Turf / Ornamentals

Table E6. Chemical Identity.

Chemical Name	flurprimidol
PC code	125701
Use	Turf / Ornamental
Application Method	Ground
Application Form	liquid
Solubility in Water (ppm)	130 mg/L

Table E7. Input parameters used to derive EECs.

Input Parameter	Symbol	Value	Units
Application Rate	A	0.75	Lbs ai/A
Incorporation	I	1	none
Runoff Fraction	R	0.05	none
Drift Fraction	D	0.01	none

Table E8. EECs for Flurprimidol. Units in y.

Description	Equation	EEC
Runoff to dry areas	$(A/I)*R$	0.0375
Runoff to semi-aquatic areas	$(A/I)*R*10$	0.375
Spray drift	$A*D$	0.0075
Total for dry areas	$((A/I)*R)+(A*D)$	0.045
Total for semi-aquatic areas	$((A/I)*R*10)+(A*D)$	0.3825

Table E9. Plant survival and growth data used for RQ derivation. Units are in Lbs ai/A.

Plant type	Seedling Emergence		Vegetative Vigor	
	EC25	NOAEC	EC25	NOAEC
Monocot	0.14	0.038	0.42	0.11
Dicot	0.012	0.0044	0.011	0.0046

Table E10. RQ values for plants in dry and semi-aquatic areas exposed to Flurprimidol through runoff and/or spray drift.*

Plant Type	Listed Status	Dry	Semi-Aquatic	Spray Drift
Monocot	non-listed	0.32	2.73	<0.1
Monocot	listed	1.18	10.07	0.20
Dicot	non-listed	3.75	31.88	0.68
Dicot	listed	10.23	86.93	1.63

*If RQ > 1.0, the LOC is exceeded, resulting in potential for risk to that plant group.

INC - inconclusive

3. Granular Application of 0.75 lbs ai/A to Turf / Ornamentals

Table E11. Chemical Identity.	
Chemical Name	flurprimidol
PC code	125701
Use	Turf / Ornamental
Application Method	Ground
Application Form	Granular
Solubility in Water (mg/L)	130 mg/L

Table E12. Input parameters used to derive EECs.			
Input Parameter	Symbol	Value	Units
Application Rate	A	0.75	lbs ai/A
Incorporation	I	1	none
Runoff Fraction	R	0.05	none
Drift Fraction	D	0	none

Table E13. EECs for Flurprimidol. Units in lbs ai/A.		
Description	Equation	EEC
Runoff to dry areas	$(A/I)*R$	0.0375
Runoff to semi-aquatic areas	$(A/I)*R*10$	0.375
Spray drift	$A*D$	0
Total for dry areas	$((A/I)*R)+(A*D)$	0.0375
Total for semi-aquatic areas	$((A/I)*R*10)+(A*D)$	0.375

Table E14. Plant survival and growth data used for RQ derivation. Units are in lbs ai/A.				
Plant type	Seedling Emergence		Vegetative Vigor	
	EC25	NOAEC	EC25	NOAEC
Monocot	0.14	0.038	0.42	0.11
Dicot	0.012	0.0044	0.011	0.0046

Table E15. RQ values for plants in dry and semi-aquatic areas exposed to Flutrlafol 125 g/l SC through runoff and/or spray drift.*				
Plant Type	Listed Status	Dry	Semi-Aquatic	Spray Drift
Monocot	non-listed	0.27	2.68	<0.1
Monocot	listed	0.99	9.87	<0.1
Dicot	non-listed	3.13	31.25	<0.1
Dicot	listed	8.52	85.23	<0.1

*If RQ > 1.0, the LOC is exceeded, resulting in potential for risk to that plant group.

4. Granular Application of 1.5 lbs ai/A to Turf / Ornamentals

Table E16. Chemical Identity.

Chemical Name	flurprimidol
PC code	125701
Use	Turf / Ornamental
Application Method	Ground
Application Form	Granular
Solubility in Water (mg/L)	130 mg/L

Table E17. Input parameters used to derive EECs.

Input Parameter	Symbol	Value	Units
Application Rate	A	1.5	lbs ai/A
Incorporation	I	1	none
Runoff Fraction	R	0.05	none
Drift Fraction	D	0	none

Table E18. EECs for Flurprimidol. Units in lbs ai/A.

Description	Equation	EEC
Runoff to dry areas	$(A/I)*R$	0.075
Runoff to semi-aquatic areas	$(A/I)*R*10$	0.75
Spray drift	$A*D$	0
Total for dry areas	$((A/I)*R)+(A*D)$	0.075
Total for semi-aquatic areas	$((A/I)*R*10)+(A*D)$	0.75

Table E19. Plant survival and growth data used for RQ derivation. Units are in lbs ai/A.

Plant type	Seedling Emergence		Vegetative Vigor	
	EC25	NOAEC	EC25	NOAEC
Monocot	0.14	0.038	0.42	0.11
Dicot	0.012	0.0044	0.011	0.0046

Table E20. RQ values for plants in dry and semi-aquatic areas exposed to Flurprimidol through runoff and/or spray drift.*

Plant Type	Listed Status	Dry	Semi-Aquatic	Spray Drift
Monocot	non-listed	0.54	5.36	<0.1
Monocot	listed	1.97	19.74	<0.1
Dicot	non-listed	6.25	62.50	<0.1
Dicot	listed	17.05	170.45	<0.1

*If RQ > 1.0, the LOC is exceeded, resulting in potential for risk to that plant group.

5. Granular Application of 3.0 lbs ai/A to Turf / Ornamentals

Table E21. Chemical Identity.

Chemical Name	flurprimidol
PC code	125701
Use	Turf / Ornamental
Application Method	Ground
Application Form	Granular
Solubility in Water (mg/L)	130 mg/L

Table E22. Input parameters used to derive EECs.

Input Parameter	Symbol	Value	Units
Application Rate	A	3.0	lbs ai/A
Incorporation	I	1	none
Runoff Fraction	R	0.05	none
Drift Fraction	D	0	none

Table E23. EECs for Flurprimidol. Units in lbs ai/A.

Description	Equation	EEC
Runoff to dry areas	$(A/I)*R$	0.15
Runoff to semi-aquatic areas	$(A/I)*R*10$	1.5
Spray drift	$A*D$	0
Total for dry areas	$((A/I)*R)+(A*D)$	0.15
Total for semi-aquatic areas	$((A/I)*R*10)+(A*D)$	1.5

Table E24. Plant survival and growth data used for RQ derivation. Units are in lbs ai/A.

Plant type	Seedling Emergence		Vegetative Vigor	
	EC25	NOAEC	EC25	NOAEC
Monocot	0.14	0.038	0.42	0.11
Dicot	0.012	0.0044	0.011	0.0046

Table E25. RQ values for plants in dry and semi-aquatic areas exposed to Flurprimidol through runoff and/or spray drift.*

Plant Type	Listed Status	Dry	Semi-Aquatic	Spray Drift
Monocot	non-listed	1.07	10.71	<0.1
Monocot	listed	3.95	39.47	<0.1
Dicot	non-listed	12.50	125.00	<0.1
Dicot	listed	34.09	340.91	<0.1

*If RQ > 1.0, the LOC is exceeded, resulting in potential for risk to that plant group.

APPENDIX F: LOCATES - Direct Effect Co-occurrence Analysis

Species Occurrence in Selected States and Selected Taxa

No species were excluded
All Medium Types Reported

Mammal, Bird, Amphibian, Reptile, Dicot, Monocot, Ferns, Conf/cycds, Lichen
AL, AK, AZ, AR, CA, CO, CT, DE, DC, FL, GA, HI, ID, IL, IN, IA, KS, KY, LA, ME, MD, MA, MI,
MN, MS, MO, MT, NE, NV, NH, NJ, NM, NY, NC, ND, OH, OK, OR, PA, PR, RI, SC, SD, TN, TX,
UT, VT, VA, WA, WV, WI, WY

Alabama		(33) species:			<u>CH</u>
Amphibian					
Salamander, Flatwoods	<i>Ambystoma cingulatum</i>	Threatened	Freshwater, Vernal pool, Terrestrial	No	
Salamander, Red Hills	<i>Phaeognathus hubrichti</i>	Threatened	Freshwater, Terrestrial	No	
Bird					
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes	
Stork, Wood	<i>Mycteria americana</i>	Endangered	Terrestrial	No	
Woodpecker, Red-cockaded	<i>Picoides borealis</i>	Endangered	Terrestrial	No	
Dicot					
Amphianthus, Little	<i>Amphianthus pusillus</i>	Threatened	Freshwater	No	
Barbara Buttons, Mohr's	<i>Marshallia mohrii</i>	Threatened	Terrestrial	No	
Bladderpod, Lyrate	<i>Lesquerella lyrata</i>	Threatened	Terrestrial	No	
Clover, Leafy Prairie	<i>Dalea foliosa</i>	Endangered	Terrestrial	No	
Harperella	<i>Ptilimnium nodosum</i>	Endangered	Freshwater	No	
Leather-flower, Alabama	<i>Clematis socialis</i>	Endangered	Terrestrial	No	
Leather-flower, Morefield's	<i>Clematis morefieldii</i>	Endangered	Terrestrial	No	
Pitcher-plant, Alabama Canebrake	<i>Sarracenia rubra alabamensis</i>	Endangered	Freshwater, Terrestrial	No	
Pitcher-plant, Green	<i>Sarracenia oreophila</i>	Endangered	Terrestrial, Freshwater	No	
Potato-bean, Price's	<i>Apios priceana</i>	Threatened	Terrestrial	No	
Ferns					
Fern, Alabama Streak-sorus	<i>Thelypteris pilosa var. alabamensis</i>	Threatened	Terrestrial	No	
Fern, American hart's-tongue	<i>Asplenium scolopendrium var. americanum</i>	Threatened	Terrestrial	No	
Quillwort, Louisiana	<i>Isoetes louisianensis</i>	Endangered	Freshwater, Terrestrial	No	
Mammal					
Bat, Gray	<i>Myotis grisescens</i>	Endangered	Subterraneous, Terrestrial	No	
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterraneous, Terrestrial	Yes	
Mouse, Alabama Beach	<i>Peromyscus polionotus ammobates</i>	Endangered	Terrestrial, Coastal (neritic)	Yes	

Mouse, Perdido Key Beach	<i>Peromyscus polionotus trissyllepsis</i>	Endangered	Coastal (neritic)	Yes
Monocot				
Grass, Tennessee Yellow-eyed	<i>Xyris tennesseensis</i>	Endangered	Terrestrial	No
Trillium, Relict	<i>Trillium reliquum</i>	Endangered	Terrestrial	No
Water-plantain, Kral's	<i>Sagittaria secundifolia</i>	Threatened	Freshwater	No
Reptile				
Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
Sea turtle, Kemp's ridley	<i>Lepidochelys kempi</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No
Snake, Eastern Indigo	<i>Drymarchon corais couperi</i>	Threatened	Terrestrial	No
Tortoise, Gopher	<i>Gopherus polyphemus</i>	Threatened	Terrestrial	No
Turtle, Alabama Red-bellied	<i>Pseudemys alabamensis</i>	Endangered	Terrestrial, Freshwater	No
Turtle, Flattened Musk	<i>Stemotherus depressus</i>	Threatened	Freshwater, Terrestrial	No
Alaska (5) species: <u>CH</u>				
Bird				
Curlew, Eskimo	<i>Numenius borealis</i>	Endangered	Terrestrial	No
Eider, Spectacled	<i>Somateria fischeri</i>	Threatened	Saltwater, Terrestrial	Yes
Eider, Steller's	<i>Polysticta stelleri</i>	Threatened	Terrestrial, Saltwater	Yes
Ferns				
Fern, Aleutian Shield	<i>Polystichum aleuticum</i>	Endangered	Terrestrial	No
Reptile				
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Arizona (38) species: <u>CH</u>				
Amphibian				
Frog, Chiricahua Leopard	<i>Rana chiricahuensis</i>	Threatened	Freshwater, Terrestrial	No
Salamander, Sonora Tiger	<i>Ambystoma tigrinum stebbinsi</i>	Endangered	Vernal pool, Freshwater, Terrestrial	No
Bird				
Bobwhite, Masked	<i>Colinus virginianus ridgwayi</i>	Endangered	Terrestrial	No
Condor, California	<i>Gymnogyps californianus</i>	Endangered	Terrestrial	Yes
Eagle, Bald	<i>Haliaeetus leucocephalus</i>	Threatened	Terrestrial	No
Falcon, Northern Aplomado	<i>Falco femoralis septentrionalis</i>	Endangered	Terrestrial	No
Flycatcher, Southwestern Willow	<i>Empidonax traillii extimus</i>	Endangered	Terrestrial	Yes
Owl, Mexican Spotted	<i>Strix occidentalis lucida</i>	Threatened	Terrestrial	Yes
Pygmy-owl, Cactus Ferruginous	<i>Glaucidium brasilianum cactorum</i>	Endangered	Terrestrial	No
Rail, Yuma Clapper	<i>Rallus longirostris yumanensis</i>	Endangered	Terrestrial	No

Dicot

Blue-star, Kearney's	<i>Amsonia kearneyana</i>	Endangered	Terrestrial	No
Cactus, Arizona Hedgehog	<i>Echinocereus triglochidiatus</i> var. <i>arizonicus</i>	Endangered	Terrestrial	No
Cactus, Brady Pincushion	<i>Pediocactus bradyi</i>	Endangered	Terrestrial	No
Cactus, Cochise Pincushion	<i>Coryphantha robbinsorum</i>	Threatened	Terrestrial	No
Cactus, Nichol's Turk's Head	<i>Echinocactus horizonthalonius</i> var. <i>nicholii</i>	Endangered	Terrestrial	No
Cactus, Peebles Navajo	<i>Pediocactus peeblesianus</i>	Endangered	Terrestrial	No
Cactus, Pima Pineapple	<i>Coryphantha scheeri</i> var. <i>robustispina</i>	Endangered	Terrestrial	No
Cactus, Siler Pincushion	<i>Pediocactus</i> (= <i>Echinocactus</i> , = <i>Utahia</i>) <i>sileri</i>	Threatened	Terrestrial	No
Cliffrose, Arizona	<i>Purshia</i> (= <i>cowania</i>) <i>subintegra</i>	Endangered	Terrestrial	No
Cycladenia, Jones	<i>Cycladenia jonesii</i> (= <i>humilis</i>)	Threatened	Terrestrial	No
Fleabane, Zuni	<i>Erigeron rhizomatus</i>	Threatened	Terrestrial	No
Groundsel, San Francisco Peaks	<i>Senecio franciscanus</i>	Threatened	Terrestrial	Yes
Milk-vetch, Holmgren	<i>Astragalus holmgreniorum</i>	Endangered	Terrestrial	No
Milk-vetch, Sentry	<i>Astragalus cremnophyllax</i> var. <i>cremnophyllax</i>	Endangered	Terrestrial	No
Milkweed, Welsh's	<i>Asclepias welshii</i>	Threatened	Terrestrial	Yes
Umbel, Huachuca Water	<i>Lilaeopsis schaffneriana</i> var. <i>recurva</i>	Endangered	Terrestrial, Freshwater	Yes

Mammal

Bat, Lesser (=Sanborn's) Long-nosed	<i>Leptonycteris curasoae yerbabuenae</i>	Endangered	Subterranean, Terrestrial	No
Ferret, Black-footed	<i>Mustela nigripes</i>	Endangered	Terrestrial	No
Jaguar	<i>Panthera onca</i>	Endangered	Terrestrial	No
Jaguarundi, Sinaloa	<i>Herpailurus</i> (= <i>Felis</i>) <i>yagouaroundi tolteca</i>	Endangered	Terrestrial	No
Ocelot	<i>Leopardus</i> (= <i>Felis</i>) <i>pardalis</i>	Endangered	Terrestrial	No
Pronghorn, Sonoran	<i>Antilocapra americana sonoriensis</i>	Endangered	Terrestrial	No
Squirrel, Mount Graham Red	<i>Tamiasciurus hudsonicus grahamensis</i>	Endangered	Terrestrial	Yes
Vole, Hualapai Mexican	<i>Microtus mexicanus hualpaiensis</i>	Endangered	Terrestrial	No

Monocot

Ladies'-tresses, Canelo Hills	<i>Spiranthes delitescens</i>	Endangered	Terrestrial	No
Sedge, Navajo	<i>Carex specuicola</i>	Threatened	Terrestrial	Yes

Reptile

Rattlesnake, New Mexican Ridge-nosed	<i>Crotalus willardi obscurus</i>	Threatened	Terrestrial	Yes
Tortoise, Desert	<i>Gopherus agassizii</i>	Threatened	Terrestrial	Yes

Arkansas

(9) species:

CH**Bird**

Tern, Interior (population) Least	<i>Sterna antillarum</i>	Endangered	Terrestrial	No
Woodpecker, Red-cockaded	<i>Picoides borealis</i>	Endangered	Terrestrial	No

Dicot

Bladderpod, Missouri	<i>Lesquerella filiformis</i>	Threatened	Terrestrial	No
Fruit, Earth (=geocarpon)	<i>Geocarpon minimum</i>	Threatened	Terrestrial	No
Harperella	<i>Ptilimnium nodosum</i>	Endangered	Freshwater	No
Pondberry	<i>Lindera melissifolia</i>	Endangered	Terrestrial	No

Mammal

Bat, Gray	<i>Myotis grisescens</i>	Endangered	Subterranean, Terrestrial	No
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes
Bat, Ozark Big-eared	<i>Corynorhinus (=Plecotus) townsendii ingens</i>	Endangered	Terrestrial, Subterranean	No

California

(232) species:

CH**Amphibian**

Frog, California Red-legged	<i>Rana aurora draytonii</i>	Threatened	Terrestrial, Freshwater	Yes
Frog, Mountain Yellow-legged	<i>Gopherus agassizii</i>	Endangered	Terrestrial, Freshwater	No
Salamander, California Tiger	<i>Ambystoma californiense</i>	Endangered	Terrestrial, Vernal pool	No
Salamander, Desert Slender	<i>Batrachoseps aridus</i>	Endangered	Freshwater, Terrestrial	No
Salamander, Santa Cruz Long-toed	<i>Ambystoma macrodactylum</i>	Endangered	Freshwater, Vernal pool, Terrestrial	No
Toad, Arroyo Southwestern	<i>Bufo californicus (=microscaphus)</i>	Endangered	Freshwater, Terrestrial	Yes

Bird

Condor, California	<i>Gymnogyps californianus</i>	Endangered	Terrestrial	Yes
Flycatcher, Southwestern Willow	<i>Empidonax traillii extimus</i>	Endangered	Terrestrial	Yes
Gnatcatcher, Coastal California	<i>Poliophtila californica californica</i>	Threatened	Terrestrial	Yes
Murrelet, Marbled	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	Freshwater, Terrestrial, Saltwater	Yes
Owl, Northern Spotted	<i>Strix occidentalis caurina</i>	Threatened	Terrestrial	Yes
Plover, Western Snowy	<i>Charadrius alexandrinus nivosus</i>	Threatened	Terrestrial	Yes
Rail, California Clapper	<i>Rallus longirostris obsoletus</i>	Endangered	Terrestrial	No
Rail, Light-footed Clapper	<i>Rallus longirostris levipes</i>	Endangered	Terrestrial	No
Rail, Yuma Clapper	<i>Rallus longirostris yumanensis</i>	Endangered	Terrestrial	No
Shrike, San Clemente Loggerhead	<i>Lanius ludovicianus meamsi</i>	Endangered	Terrestrial	No
Sparrow, San Clemente Sage	<i>Amphispiza belli clementeae</i>	Threatened	Terrestrial	No
Tern, California Least	<i>Sterna antillarum browni</i>	Endangered	Terrestrial	No

Towhee, Inyo Brown	<i>Pipilo crissalis eremophilus</i>	Threatened	Terrestrial	Yes
Vireo, Least Bell's	<i>Vireo bellii pusillus</i>	Endangered	Terrestrial	Yes
Conf/cycds				
Cypress, Gowen	<i>Cupressus goveniana ssp. goveniana</i>	Threatened	Terrestrial	No
Cypress, Santa Cruz	<i>Cupressus abramsiana</i>	Endangered	Terrestrial	No
Dicot				
Adobe Sunburst, San Joaquin	<i>Pseudobahia peirsonii</i>	Threatened	Terrestrial	No
Allocarya, Calistoga	<i>Plagiobothrys strictus</i>	Endangered	Vernal pool	No
Ambrosia, San Diego	<i>Ambrosia pumila</i>	Endangered	Terrestrial	No
Baccharis, Encinitas	<i>Baccharis vanessae</i>	Threatened	Terrestrial	No
Barberry, Island	<i>Berberis pinnata ssp. insularis</i>	Endangered	Terrestrial	No
Barberry, Nevin's	<i>Berberis nevinii</i>	Endangered	Terrestrial	No
Bedstraw, El Dorado	<i>Galium californicum ssp. sierrae</i>	Endangered	Terrestrial	No
Bedstraw, Island	<i>Galium buxifolium</i>	Endangered	Terrestrial	No
Bird's-beak, Palmate-bracted	<i>Cordylanthus palmatus</i>	Endangered	Terrestrial	No
Bird's-beak, Pennell's	<i>Cordylanthus tenuis ssp. capillaris</i>	Endangered	Terrestrial	No
Bird's-beak, salt marsh	<i>Cordylanthus maritimus ssp. maritimus</i>	Endangered	Saltwater	No
Bird's-beak, Soft	<i>Cordylanthus mollis ssp. mollis</i>	Endangered	Brackish, Saltwater	No
Bladderpod, San Bernardino Mountains	<i>Lesquerella kingii ssp. bernardina</i>	Endangered	Terrestrial	Yes
Bluecurls, Hidden Lake	<i>Trichostema austromontanum ssp. compactum</i>	Threatened	Terrestrial	No
Broom, San Clemente Island	<i>Lotus dendroideus ssp. traskiae</i>	Endangered	Terrestrial	No
Buckwheat, Cushenbury	<i>Eriogonum ovalifolium var. vineum</i>	Endangered	Terrestrial	Yes
Buckwheat, lone (incl. Irish Hill)	<i>Eriogonum apricum (incl. var. prostratum)</i>	Endangered	Terrestrial	No
Buckwheat, Southern Mountain Wild	<i>Eriogonum kennedyi var. austromontanum</i>	Threatened	Terrestrial	No
Bush-mallow, San Clemente Island	<i>Malacothamnus clementinus</i>	Endangered	Terrestrial	No
Bush-mallow, Santa Cruz Island	<i>Malacothamnus fasciculatus var. nesioticus</i>	Endangered	Terrestrial	No
Butterweed, Layne's	<i>Senecio layneae</i>	Threatened	Terrestrial	No
Button-celery, San Diego	<i>Eryngium aristulatum var. parishii</i>	Endangered	Terrestrial	No
Cactus, Bakersfield	<i>Opuntia treleasei</i>	Endangered	Terrestrial	No
Ceanothus, Coyote	<i>Ceanothus ferrisae</i>	Endangered	Terrestrial	No
Ceanothus, Pine Hill	<i>Ceanothus roderickii</i>	Endangered	Terrestrial	No
Ceanothus, Vail Lake	<i>Ceanothus ophiocylus</i>	Threatened	Terrestrial	No
Centaury, Spring-loving	<i>Centaureum namophilum</i>	Threatened	Terrestrial	Yes
Checker-mallow, Keck's	<i>Sidalcea keckii</i>	Endangered	Terrestrial	Yes

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Checker-mallow, Kenwood Marsh	<i>Sidalcea oregana ssp. valida</i>	Endangered	Terrestrial	No
Checker-mallow, Pedate	<i>Sidalcea pedata</i>	Endangered	Terrestrial	No
Clarkia, Pismo	<i>Clarkia speciosa ssp. immaculata</i>	Endangered	Terrestrial	No
Clarkia, Presidio	<i>Clarkia franciscana</i>	Endangered	Terrestrial	No
Clarkia, Springville	<i>Clarkia springvillensis</i>	Threatened	Terrestrial	No
Clarkia, Vine Hill	<i>Clarkia imbricata</i>	Endangered	Terrestrial	No
Clover, Fleshy Owl's	<i>Castilleja campestris ssp.</i>	Threatened	Vernal pool	Yes
Clover, Monterey	<i>Trifolium trichocalyx</i>	Endangered	Terrestrial	No
Clover, Showy Indian	<i>Trifolium amoenum</i>	Endangered	Terrestrial	No
Coyote-thistle, Loch Lomond	<i>Eryngium constancei</i>	Endangered	Terrestrial	No
Crownbeard, Big-leaved	<i>Verbesina dissita</i>	Threatened	Terrestrial	No
Crownscale, San Jacinto Valley	<i>Atriplex coronata var. notatior</i>	Endangered	Terrestrial	No
Daisy, Parish's	<i>Erigeron parishii</i>	Threatened	Freshwater	Yes
Dudleya, Conejo	<i>Dudleya abramsii ssp. parva</i>	Threatened	Terrestrial	No
Dudleya, Marcescent	<i>Dudleya cymosa ssp. marcescens</i>	Threatened	Terrestrial	No
Dudleya, Santa Clara Valley	<i>Dudleya setchellii</i>	Endangered	Terrestrial	No
Dudleya, Santa Cruz Island	<i>Dudleya nesiotica</i>	Threatened	Terrestrial	No
Dudleya, Santa Monica Mountains	<i>Dudleya cymosa ssp. ovatifolia</i>	Threatened	Terrestrial	No
Dudleya, Verity's	<i>Dudleya verityi</i>	Threatened	Terrestrial	No
Dwarf-flax, Marin	<i>Hesperolinon congestum</i>	Threatened	Terrestrial	No
Evening-primrose, Antioch Dunes	<i>Oenothera deltoides ssp. howellii</i>	Endangered	Terrestrial	Yes
Evening-primrose, Eureka Valley	<i>Oenothera avita ssp. eurekaensis</i>	Endangered	Terrestrial	No
Evening-primrose, San Benito	<i>Camissonia benitensis</i>	Threatened	Terrestrial	No
Fiddleneck, Large-flowered	<i>Amsinckia grandiflora</i>	Endangered	Terrestrial	Yes
Flannelbush, Mexican	<i>Fremontodendron mexicanum</i>	Endangered	Terrestrial	No
Flannelbush, Pine Hill	<i>Fremontodendron californicum ssp. decumbens</i>	Endangered	Terrestrial	No
Fringepod, Santa Cruz Island	<i>Thysanocarpus conchuliferus</i>	Endangered	Terrestrial	No
Gilia, Hoffmann's Slender-flowered	<i>Gilia tenuiflora ssp. hoffmannii</i>	Endangered	Terrestrial	No
Gilia, Monterey	<i>Gilia tenuiflora ssp. arenaria</i>	Endangered	Terrestrial	No
Golden Sunburst, Hartweg's	<i>Pseudobahia bahiifolia</i>	Endangered	Terrestrial	No
Goldfields, Burke's	<i>Lasthenia burkei</i>	Endangered	Terrestrial	No
Goldfields, Contra Costa	<i>Lasthenia conjugens</i>	Endangered	Terrestrial	Yes
Grass, Hairy Orcutt	<i>Orcuttia pilosa</i>	Endangered	Vernal pool	Yes
Grass, Sacramento Orcutt	<i>Orcuttia viscida</i>	Endangered	Vernal pool	Yes
Grass, Slender Orcutt	<i>Orcuttia tenuis</i>	Threatened	Vernal pool	Yes
Gumplant, Ash Meadows	<i>Grindelia fraxino-pratensis</i>	Threatened	Terrestrial	Yes

Ivesia, Ash Meadows	<i>Ivesia kingii</i> var. <i>eremica</i>	Threatened	Terrestrial	Yes
Jewelflower, California	<i>Caulanthus californicus</i>	Endangered	Terrestrial	No
Jewelflower, Metcalf Canyon	<i>Streptanthus albidus</i> ssp. <i>albidus</i>	Endangered	Terrestrial	No
Jewelflower, Tiburon	<i>Streptanthus niger</i>	Endangered	Terrestrial	No
Larkspur, Baker's	<i>Delphinium bakeri</i>	Endangered	Terrestrial	Yes
Larkspur, San Clemente Island	<i>Delphinium variegatum</i> ssp. <i>kinkiense</i>	Endangered	Terrestrial	No
Larkspur, Yellow	<i>Delphinium luteum</i>	Endangered	Terrestrial	Yes
Layia, Beach	<i>Layia carnosa</i>	Endangered	Terrestrial, Coastal (neritic)	No
Lessingia, San Francisco	<i>Lessingia germanorum</i> (=L.g. var. <i>germanorum</i>)	Endangered	Terrestrial	No
Liveforever, Laguna Beach	<i>Dudleya stolonifera</i>	Threatened	Terrestrial	No
Liveforever, Santa Barbara Island	<i>Dudleya traskiae</i>	Endangered	Terrestrial	No
Lupine, Clover	<i>Lupinus tidestromii</i>	Endangered	Coastal (neritic)	No
Lupine, Nipomo Mesa	<i>Lupinus nipomensis</i>	Endangered	Coastal (neritic)	No
Malacothrix, Island	<i>Malacothrix squalida</i>	Endangered	Terrestrial	No
Malacothrix, Santa Cruz Island	<i>Malacothrix indecora</i>	Endangered	Terrestrial	No
Mallow, Kern	<i>Eremalche kernensis</i>	Endangered	Terrestrial	No
Manzanita, Del Mar	<i>Arctostaphylos glandulosa</i> ssp. <i>crassifolia</i>	Endangered	Terrestrial	No
Manzanita, Lone	<i>Arctostaphylos myrtifolia</i>	Threatened	Terrestrial	No
Manzanita, Morro	<i>Arctostaphylos morroensis</i>	Threatened	Terrestrial	No
Manzanita, Pallid	<i>Arctostaphylos pallida</i>	Threatened	Terrestrial	No
Manzanita, Presidio (=Raven's)	<i>Arctostaphylos hookeri</i> var. <i>ravenii</i>	Endangered	Terrestrial	No
Manzanita, Santa Rosa Island	<i>Arctostaphylos confertiflora</i>	Endangered	Terrestrial	No
Meadowfoam, Butte County	<i>Limnanthes floccosa</i> ssp.	Endangered	Vernal pool	Yes
Meadowfoam, Sebastopol	<i>Limnanthes vincularis</i>	Endangered	Freshwater, Terrestrial	No
Milk-vetch, Braunton's	<i>Astragalus brauntonii</i>	Endangered	Terrestrial	No
Milk-vetch, Clara Hunt's	<i>Astragalus clarianus</i>	Endangered	Terrestrial	No
Milk-vetch, Coachella Valley	<i>Astragalus lentiginosus</i> var. <i>coachellae</i>	Endangered	Terrestrial	Yes
Milk-vetch, Coastal Dunes	<i>Astragalus tener</i> var. <i>titi</i>	Endangered	Terrestrial	No
Milk-vetch, Cushenbury	<i>Astragalus albens</i>	Endangered	Terrestrial	Yes
Milk-vetch, Fish Slough	<i>Astragalus lentiginosus</i> var. <i>piscinensis</i>	Threatened	Terrestrial	No
Milk-vetch, Lane Mountain	<i>Astragalus jaegerianus</i>	Endangered	Terrestrial	Yes
Milk-vetch, Pierson's	<i>Astragalus magdalenae</i> var.	Threatened	Terrestrial	Yes
Milk-vetch, Triple-ribbed	<i>Astragalus tricarinatus</i>	Endangered	Terrestrial	No
Milk-vetch, Ventura Marsh	<i>Astragalus pycnostachyus</i> var. <i>lanosissimus</i>	Endangered	Terrestrial, Freshwater	Yes

Mint, Otay Mesa	<i>Pogogyne nudiuscula</i>	Endangered	Terrestrial	No
Mint, San Diego Mesa	<i>Pogogyne abramsii</i>	Endangered	Terrestrial	No
Monardella, Willow	<i>Monardella linoides</i> ssp. <i>viminea</i>	Endangered	Terrestrial	No
Morning-glory, Stebbins	<i>Calystegia stebbinsii</i>	Endangered	Terrestrial	No
Mountainbalm, Indian Knob	<i>Eriodictyon altissimum</i>	Endangered	Terrestrial	No
Mountain-mahogany, Catalina Island	<i>Cercocarpus traskiae</i>	Endangered	Terrestrial	No
Mustard, Slender-petaled	<i>Thelypodium stenopetalum</i>	Endangered	Terrestrial	No
Navarretia, Few-flowered	<i>Navarretia leucocephala</i> ssp. <i>pauciflora</i> (=N. <i>pauciflora</i>)	Endangered	Vernal pool, Terrestrial	No
Navarretia, Many-flowered	<i>Navarretia leucocephala</i> ssp. <i>plieantha</i>	Endangered	Terrestrial, Vernal pool	No
Navarretia, Spreading	<i>Navarretia fossalis</i>	Threatened	Vernal pool	No
Niterwort, Amargosa	<i>Nitrophila mohavensis</i>	Endangered	Terrestrial	Yes
Oxytheca, Cushenbury	<i>Oxytheca parishii</i> var. <i>goodmaniana</i>	Endangered	Terrestrial	Yes
Paintbrush, Ash-grey Indian	<i>Castilleja cinerea</i>	Threatened	Terrestrial	No
Paintbrush, San Clemente Island Indian	<i>Castilleja grisea</i>	Endangered	Terrestrial	No
Paintbrush, Soft-leaved	<i>Castilleja mollis</i>	Endangered	Terrestrial	No
Paintbrush, Tiburon	<i>Castilleja affinis</i> ssp. <i>neglecta</i>	Endangered	Terrestrial	No
Penny-cress, Kneeland Prairie	<i>Thlaspi californicum</i>	Endangered	Terrestrial	Yes
Pentachaeta, Lyon's	<i>Pentachaeta lyonii</i>	Endangered	Terrestrial	No
Pentachaeta, White-rayed	<i>Pentachaeta bellidiflora</i>	Endangered	Terrestrial	No
Phacelia, Island	<i>Phacelia insularis</i> ssp. <i>insularis</i>	Endangered	Terrestrial	No
Phlox, Yreka	<i>Phlox hirsuta</i>	Endangered	Terrestrial	No
Polygonum, Scott's Valley	<i>Polygonum hickmanii</i>	Endangered	Terrestrial	Yes
Potentilla, Hickman's	<i>Potentilla hickmanii</i>	Endangered	Terrestrial	No
Pussypaws, Mariposa	<i>Calyptridium pulchellum</i>	Threatened	Terrestrial	No
Rock-cress, Hoffmann's	<i>Arabis hoffmannii</i>	Endangered	Terrestrial	No
Rock-cress, McDonald's	<i>Arabis mcdonaldiana</i>	Endangered	Terrestrial	No
Rock-cress, Santa Cruz Island	<i>Sibara filifolia</i>	Endangered	Terrestrial	No
Rush-rose, Island	<i>Helianthemum greenii</i>	Threatened	Terrestrial	No
Sandwort, Bear Valley	<i>Arenaria ursina</i>	Threatened	Terrestrial	No
Sandwort, Marsh	<i>Arenaria paludicola</i>	Endangered	Freshwater, Terrestrial	No
Sea-blite, California	<i>Suaeda californica</i>	Endangered	Terrestrial	No
Spineflower, Ben Lomond	<i>Chorizanthe pungens</i> var. <i>hartwegiana</i>	Endangered	Terrestrial	No
Spineflower, Howell's	<i>Chorizanthe howellii</i>	Endangered	Terrestrial	No
Spineflower, Monterey	<i>Chorizanthe pungens</i> var. <i>pungens</i>	Threatened	Terrestrial	Yes
Spineflower, Orcutt's	<i>Chorizanthe orcuttiana</i>	Endangered	Terrestrial	No

Spineflower, Robust	<i>Chorizanthe robusta</i> var. <i>robusta</i>	Endangered	Terrestrial	Yes
Spineflower, Scotts Valley	<i>Chorizanthe robusta</i> var. <i>hartwegii</i>	Endangered	Terrestrial	Yes
Spineflower, Slender-horned	<i>Dodecahema leptoceras</i>	Endangered	Terrestrial	No
Spineflower, Sonoma	<i>Chorizanthe valida</i>	Endangered	Terrestrial	No
Spurge, Hoover's	<i>Chamaesyce hooveri</i>	Threatened	Vernal pool	Yes
Stickseed, Baker's	<i>Blennosperma bakeri</i>	Endangered	Vernal pool	No
Stonecrop, Lake County	<i>Parvisedum leiocarpum</i>	Endangered	Vernal pool	No
Sunflower, San Mateo Woolly	<i>Eriophyllum latilobum</i>	Endangered	Terrestrial	No
Taraxacum, California	<i>Taraxacum californicum</i>	Endangered	Terrestrial	No
Tarplant, Gaviota	<i>Deinandra increscens</i> ssp. <i>villosa</i>	Endangered	Terrestrial	Yes
Tarplant, Otay	<i>Deinandra</i> (= <i>Hemizonia</i>) <i>conjugens</i>	Threatened	Terrestrial	Yes
Tarplant, Santa Cruz	<i>Holocarpha macradenia</i>	Threatened	Terrestrial	Yes
Thistle, Chorro creek Bog	<i>Cirsium fontinale</i> var. <i>obispoense</i>	Endangered	Terrestrial, Freshwater	No
Thistle, Fountain	<i>Cirsium fontinale</i> var. <i>fontinale</i>	Endangered	Terrestrial	No
Thistle, La Graciosa	<i>Cirsium loncholepis</i>	Endangered	Coastal (neritic), Freshwater, Saltwater, Brackish	Yes
Thistle, Suisun	<i>Cirsium hydrophilum</i> var. <i>hydrophilum</i>	Endangered	Brackish, Terrestrial	No
Thornmint, San Diego	<i>Acanthomintha ilicifolia</i>	Threatened	Terrestrial	No
Thornmint, San Mateo	<i>Acanthomintha obovata</i> ssp. <i>duttonii</i>	Endangered	Terrestrial	No
Tuctoria, Green's	<i>Tuctoria greenii</i>	Endangered	Vernal pool	Yes
Vervain, California	<i>Verbena californica</i>	Threatened	Terrestrial	No
Wallflower, Ben Lomond	<i>Erysimum teretifolium</i>	Endangered	Terrestrial	No
Wallflower, Contra Costa	<i>Erysimum capitatum</i> var.	Endangered	Terrestrial	Yes
Wallflower, Menzie's	<i>Erysimum menziesii</i>	Endangered	Terrestrial	No
Watercress, Gambel's	<i>Rorippa gambellii</i>	Endangered	Terrestrial, Brackish, Freshwater	No
Woodland-star, San Clemente Island	<i>Lithophragma maximum</i>	Endangered	Terrestrial	No
Woolly-star, Santa Ana River	<i>Eriastrum densifolium</i> ssp. <i>sanctorum</i>	Endangered	Terrestrial	No
Woolly-threads, San Joaquin	<i>Monolopia</i> (= <i>Lembertia</i>) <i>congdonii</i>	Endangered	Terrestrial	No
Yerba Santa, Lompoc	<i>Eriodictyon capitatum</i>	Endangered	Terrestrial	Yes
Mammal				
Fox, San Joaquin Kit	<i>Vulpes macrotis mutica</i>	Endangered	Terrestrial	No
Fox, San Miguel Island	<i>Urocyon littoralis littoralis</i>	Endangered	Terrestrial	Yes
Fox, Santa Catalina Island	<i>Urocyon littoralis catalinae</i>	Endangered	Terrestrial	Yes
Fox, Santa Cruz Island	<i>Urocyon littoralis santacruzae</i>	Endangered	Terrestrial	Yes
Fox, Santa Rosa Island	<i>Urocyon littoralis santarosae</i>	Endangered	Terrestrial	Yes

Kangaroo Rat, Fresno	<i>Dipodomys nitratoide exilis</i>	Endangered	Terrestrial	Yes
Kangaroo Rat, Giant	<i>Dipodomys ingens</i>	Endangered	Terrestrial	No
Kangaroo Rat, Morro Bay	<i>Dipodomys heermanni morroensis</i>	Endangered	Terrestrial	Yes
Kangaroo Rat, San Bernardino Merriam's	<i>Dipodomys merriami parvus</i>	Endangered	Terrestrial	Yes
Kangaroo Rat, Stephens'	<i>Dipodomys stephensi (incl. D. cascus)</i>	Endangered	Terrestrial	No
Kangaroo Rat, Tipton	<i>Dipodomys nitratoide nitratoide</i>	Endangered	Terrestrial	No
Mountain Beaver, Point Arena	<i>Aplodontia rufa nigra</i>	Endangered	Freshwater, Terrestrial	No
Mouse, Pacific Pocket	<i>Perognathus longimembris</i>	Endangered	Terrestrial	No
Mouse, Salt Marsh Harvest	<i>Reithrodontomys raviventris</i>	Endangered	Terrestrial	No
Rabbit, Riparian Brush	<i>Sylvilagus bachmani riparius</i>	Endangered	Terrestrial	No
Sheep, Peninsular Bighorn	<i>Ovis canadensis</i>	Endangered	Terrestrial	Yes
Sheep, Sierra Nevada Bighorn	<i>Ovis canadensis californiana</i>	Endangered	Terrestrial	No
Shrew, Buena Vista Lake Ornate	<i>Sorex ornatus relictus</i>	Endangered	Terrestrial	Yes
Vole, Amargosa	<i>Microtus californicus scirpensis</i>	Endangered	Terrestrial	Yes
Woodrat, Riparian	<i>Neotoma fuscipes riparia</i>	Endangered	Terrestrial	No

Monocot

Alopecurus, Sonoma	<i>Alopecurus aequalis var. sonomensis</i>	Endangered	Terrestrial	No
Amole, Cammatta Canyon	<i>Chlorogalum purpureum var. reductum</i>	Threatened	Terrestrial	Yes
Amole, Purple	<i>Chlorogalum purpureum var. purpureum</i>	Threatened	Terrestrial	Yes
Bluegrass, Napa	<i>Poa napensis</i>	Endangered	Terrestrial, Freshwater	No
Bluegrass, San Bernardino	<i>Poa atropurpurea</i>	Endangered	Terrestrial	No
Brodiaea, Chinese Camp	<i>Brodiaea pallida</i>	Threatened	Terrestrial	No
Brodiaea, Thread-leaved	<i>Brodiaea filifolia</i>	Threatened	Terrestrial	Yes
Grass, California Orcutt	<i>Orcuttia californica</i>	Endangered	Vernal pool, Terrestrial	No
Grass, Colusa	<i>Neostapfia colusana</i>	Threatened	Vernal pool	No
Grass, Eureka Dune	<i>Swallenia alexandrae</i>	Endangered	Terrestrial	No
Grass, San Joaquin Valley Orcutt	<i>Orcuttia inaequalis</i>	Threatened	Vernal pool	Yes
Grass, Solano	<i>Tuctoria mucronata</i>	Endangered	Vernal pool, Terrestrial	Yes
Lily, Pitkin Marsh	<i>Lilium pardalinum ssp. pitkinense</i>	Endangered	Freshwater	No
Lily, Tiburon Mariposa	<i>Calochortus tiburonensis</i>	Threatened	Terrestrial	No
Lily, Western	<i>Lilium occidentale</i>	Endangered	Terrestrial	No
Onion, Munz's	<i>Allium munzii</i>	Endangered	Terrestrial	No
Piperia, Yadon's	<i>Piperia yadonii</i>	Endangered	Terrestrial	No
Sedge, White	<i>Carex albida</i>	Endangered	Freshwater, Terrestrial	No

Reptile

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Lizard, Blunt-nosed Leopard	<i>Gambelia silus</i>	Endangered	Terrestrial	No
Lizard, Coachella Valley Fringe-toed	<i>Uma inornata</i>	Threatened	Terrestrial	Yes
Lizard, Island Night	<i>Xantusia riversiana</i>	Threatened	Terrestrial	No
Sea turtle, green	<i>Chelonia mydas</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No
Sea turtle, olive ridley	<i>Lepidochelys olivacea</i>	Threatened	Saltwater	No
Snake, Giant Garter	<i>Thamnophis gigas</i>	Threatened	Freshwater, Terrestrial	No
Snake, San Francisco Garter	<i>Thamnophis sirtalis tetrataenia</i>	Endangered	Freshwater, Terrestrial	No
Tortoise, Desert	<i>Gopherus agassizii</i>	Threatened	Terrestrial	Yes
Whipsnake (=Striped Racer), Alameda	<i>Masticophis lateralis euryxanthus</i>	Threatened	Terrestrial	Yes

Colorado

(17) species:

CH

Bird

Crane, Whooping	<i>Grus americana</i>	Endangered	Terrestrial, Freshwater	Yes
Owl, Mexican Spotted	<i>Strix occidentalis lucida</i>	Threatened	Terrestrial	Yes

Dicot

Beardtongue, Penland	<i>Penstemon penlandii</i>	Endangered	Terrestrial	No
Bladderpod, Dudley Bluffs	<i>Lesquerella congesta</i>	Threatened	Terrestrial	No
Butterfly Plant, Colorado	<i>Gaura neomexicana</i> var. <i>coloradensis</i>	Threatened	Terrestrial	Yes
Cactus, Knowlton	<i>Pediocactus knowltonii</i>	Endangered	Terrestrial	No
Cactus, Mesa Verde	<i>Sclerocactus mesae-verdae</i>	Threatened	Terrestrial	No
Cactus, Uinta Basin Hookless	<i>Sclerocactus glaucus</i>	Threatened	Terrestrial	No
Milk-vetch, Mancos	<i>Astragalus humillimus</i>	Endangered	Terrestrial	No
Milk-vetch, Osterhout	<i>Astragalus osterhoutii</i>	Endangered	Terrestrial	No
Mustard, Penland Alpine Fen	<i>Eutrema penlandii</i>	Threatened	Terrestrial, Freshwater	No
Phacelia, North Park	<i>Phacelia formosula</i>	Endangered	Terrestrial	No
Twinpod, Dudley Bluffs	<i>Physaria obcordata</i>	Threatened	Terrestrial	No
Wild-buckwheat, Clay-loving	<i>Eriogonum pelinophilum</i>	Endangered	Terrestrial	Yes

Mammal

Ferret, Black-footed	<i>Mustela nigripes</i>	Endangered	Terrestrial	No
Mouse, Preble's Meadow Jumping	<i>Zapus hudsonius preblei</i>	Threatened	Terrestrial	Yes

Monocot

Ladies'-tresses, Ute	<i>Spiranthes diluvialis</i>	Threatened	Terrestrial	No
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Connecticut

(11) species:

CH

Bird

Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
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Tern, Roseate	<i>Sterna dougallii dougallii</i>	Endangered	Terrestrial	No
Dicot				
Gerardia, Sandplain	<i>Agalinis acuta</i>	Endangered	Terrestrial	No
Mammal				
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterraneous, Terrestrial	Yes
Monocot				
Pogonia, Small Whorled	<i>Isotria medeoloides</i>	Threatened	Terrestrial	No
Reptile				
Sea turtle, green	<i>Chelonia mydas</i>	Endangered	Saltwater	No
Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
Sea turtle, Kemp's ridley	<i>Lepidochelys kempii</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No
Turtle, Bog (Northern population)	<i>Clemmys muhlenbergii</i>	Threatened	Terrestrial, Freshwater	No

Delaware

(10) species:

CH

Bird

Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
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Mammal

Squirrel, Delmarva Peninsula Fox	<i>Sciurus niger cinereus</i>	Endangered	Terrestrial	No
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Monocot

Pink, Swamp	<i>Helonias bullata</i>	Threatened	Terrestrial, Freshwater	No
Pogonia, Small Whorled	<i>Isotria medeoloides</i>	Threatened	Terrestrial	No

Reptile

Sea turtle, green	<i>Chelonia mydas</i>	Endangered	Saltwater	No
Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
Sea turtle, Kemp's ridley	<i>Lepidochelys kempii</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No
Turtle, Bog (Northern population)	<i>Clemmys muhlenbergii</i>	Threatened	Terrestrial, Freshwater	No

Florida

(88) species:

CH

Amphibian

Salamander, Flatwoods	<i>Ambystoma cingulatum</i>	Threatened	Freshwater, Vernal pool, Terrestrial	No
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Bird

Caracara, Audubon's Crested	<i>Polyborus plancus audubonii</i>	Threatened	Terrestrial	No
Kite, Everglade Snail	<i>Rostrhamus sociabilis plumbeus</i>	Endangered	Terrestrial	Yes
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes

Scrub-Jay, Florida	<i>Aphelocoma coerulescens</i>	Threatened	Terrestrial	No
Sparrow, Cape Sable Seaside	<i>Ammodramus maritimus mirabilis</i>	Endangered	Terrestrial	Yes
Sparrow, Florida Grasshopper	<i>Ammodramus savannarum floridanus</i>	Endangered	Terrestrial	No
Stork, Wood	<i>Mycteria americana</i>	Endangered	Terrestrial	No
Tern, Roseate	<i>Sterna dougallii dougallii</i>	Endangered	Terrestrial	No
Woodpecker, Red-cockaded	<i>Picoides borealis</i>	Endangered	Terrestrial	No

Conf/cycds

Torreya, Florida	<i>Torreya taxifolia</i>	Endangered	Terrestrial	No
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Dicot

Aster, Florida Golden	<i>Chrysopsis floridana</i>	Endangered	Terrestrial	No
Bellflower, Brooksville	<i>Campanula robinsiae</i>	Endangered	Terrestrial	No
Birds-in-a-nest, White	<i>Macbridea alba</i>	Threatened	Terrestrial	No
Blazing Star, Scrub	<i>Liatris ohlingerae</i>	Endangered	Terrestrial	No
Bonamia, Florida	<i>Bonamia grandiflora</i>	Threatened	Terrestrial	No
Buckwheat, Scrub	<i>Eriogonum longifolium</i> var. <i>gnaphalifolium</i>	Threatened	Terrestrial	No
Butterwort, Godfrey's	<i>Pinguicula ionantha</i>	Threatened	Terrestrial, Freshwater	No
Cactus, Key Tree	<i>Pilosocereus robinii</i>	Endangered	Terrestrial	No
Campion, Fringed	<i>Silene polypetala</i>	Endangered	Terrestrial	No
Chaffseed, American	<i>Schwalbea americana</i>	Endangered	Terrestrial	No
Fringe Tree, Pygmy	<i>Chionanthus pygmaeus</i>	Endangered	Terrestrial	No
Gooseberry, Miccosukee	<i>Ribes echinellum</i>	Threatened	Terrestrial	No
Gourd, Okeechobee	<i>Cucurbita okeechobeensis</i> ssp. <i>okeechobeensis</i>	Endangered	Terrestrial	No
Harebells, Avon Park	<i>Crotalaria avonensis</i>	Endangered	Terrestrial	No
Hypericum, Highlands Scrub	<i>Hypericum cumulicola</i>	Endangered	Terrestrial	No
Jacquemontia, Beach	<i>Jacquemontia reclinata</i>	Endangered	Terrestrial, Coastal (neritic)	No
Lead-plant, Crenulate	<i>Amorpha crenulata</i>	Endangered	Terrestrial	No
Lupine, Scrub	<i>Lupinus aridorum</i>	Endangered	Terrestrial	No
Meadowrue, Cooley's	<i>Thalictrum cooleyi</i>	Endangered	Terrestrial	No
Milkpea, Small's	<i>Galactia smallii</i>	Endangered	Terrestrial	No
Mint, Garrett's	<i>Dicerandra christmanii</i>	Endangered	Terrestrial	No
Mint, Lakela's	<i>Dicerandra immaculata</i>	Endangered	Terrestrial	No
Mint, Longspurred	<i>Dicerandra comutissima</i>	Endangered	Terrestrial	No
Mint, Scrub	<i>Dicerandra frutescens</i>	Endangered	Terrestrial	No
Mustard, Carter's	<i>Warea carteri</i>	Endangered	Terrestrial	No
Pawpaw, Beautiful	<i>Deeringothamnus pulchellus</i>	Endangered	Terrestrial	No

Pawpaw, Four-petal	<i>Asimina tetramera</i>	Endangered	Terrestrial	No
Pawpaw, Ruge's	<i>Deeringothamnus rugelii</i>	Endangered	Terrestrial	No
Pinkroot, Gentian	<i>Spigelia gentianoides</i>	Endangered	Terrestrial	No
Plum, Scrub	<i>Prunus geniculata</i>	Endangered	Terrestrial	No
Polygala, Lewton's	<i>Polygala lewtonii</i>	Endangered	Terrestrial	No
Polygala, Tiny	<i>Polygala smallii</i>	Endangered	Terrestrial	No
Prickly-apple, Fragrant	<i>Cereus eriophorus</i> var. <i>fragrans</i>	Endangered	Terrestrial	No
Rhododendron, Chapman	<i>Rhododendron chapmanii</i>	Endangered	Terrestrial	No
Rosemary, Apalachicola	<i>Conradina glabra</i>	Endangered	Terrestrial	No
Rosemary, Etonia	<i>Conradina etonia</i>	Endangered	Terrestrial	No
Rosemary, Short-leaved	<i>Conradina brevifolia</i>	Endangered	Terrestrial	No
Sandlace	<i>Polygonella myriophylla</i>	Endangered	Terrestrial	No
Skullcap, Florida	<i>Scutellaria floridana</i>	Threatened	Terrestrial	No
Snakeroot	<i>Eryngium cuneifolium</i>	Endangered	Terrestrial	No
Spurge, Deltoid	<i>Chamaesyce deltoidea</i> ssp. <i>deltoidea</i>	Endangered	Terrestrial	No
Spurge, Garber's	<i>Chamaesyce garberi</i>	Threatened	Terrestrial	No
Spurge, Telephus	<i>Euphorbia telephioides</i>	Threatened	Terrestrial	No
Warea, Wide-leaf	<i>Warea amplexifolia</i>	Endangered	Terrestrial	No
Water-willow, Cooley's	<i>Justicia cooleyi</i>	Endangered	Terrestrial	No
Whitlow-wort, Papery	<i>Paronychia chartacea</i>	Threatened	Terrestrial	No
Wings, Pigeon	<i>Clitoria fragrans</i>	Threatened	Terrestrial	No
Wireweed	<i>Polygonella basiramia</i>	Endangered	Terrestrial	No
Ziziphus, Florida	<i>Ziziphus celata</i>	Endangered	Terrestrial	No
Lichen				
Cladonia, Florida Perforate	<i>Cladonia perforata</i>	Endangered	Terrestrial	No
Mammal				
Bat, Gray	<i>Myotis grisescens</i>	Endangered	Subterranean, Terrestrial	No
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes
Deer, Key	<i>Odocoileus virginianus clavium</i>	Endangered	Terrestrial	No
Mouse, Anastasia Island Beach	<i>Peromyscus polionotus phasma</i>	Endangered	Terrestrial, Coastal (neritic)	No
Mouse, Choctawhatchee Beach	<i>Peromyscus polionotus allophrys</i>	Endangered	Coastal (neritic), Terrestrial	Yes
Mouse, Key Largo Cotton	<i>Peromyscus gossypinus</i>	Endangered	Terrestrial	No
Mouse, Perdido Key Beach	<i>Peromyscus polionotus trissyllepsis</i>	Endangered	Coastal (neritic)	Yes
Mouse, Southeastern Beach	<i>Peromyscus polionotus niveiventris</i>	Threatened	Coastal (neritic), Terrestrial	No

Mouse, St. Andrew Beach	<i>Peromyscus polionotus</i>	Endangered	Terrestrial, Coastal (neritic)	No
Panther, Florida	<i>Puma (=Felis) concolor coryi</i>	Endangered	Terrestrial	No
Rabbit, Lower Keys Marsh	<i>Sylvilagus palustris hefneri</i>	Endangered	Terrestrial	No
Rice Rat (=Silver Rice Rat)	<i>Oryzomys palustris natator</i>	Endangered	Terrestrial	Yes
Vole, Florida Salt Marsh	<i>Microtus pennsylvanicus dukecampbelli</i>	Endangered	Terrestrial, Brackish	No
Woodrat, Key Largo	<i>Neotoma floridana smalli</i>	Endangered	Terrestrial	No
Monocot				
Beargrass, Britton's	<i>Nolina brittoniana</i>	Endangered	Terrestrial	No
Beauty, Harper's	<i>Harperocalis flava</i>	Endangered	Freshwater, Terrestrial	No
Seagrass, Johnson's	<i>Halophila johnsonii</i>	Threatened	Coastal (neritic), Saltwater	Yes
Reptile				
Crocodile, American	<i>Crocodylus acutus</i>	Threatened	Terrestrial, Freshwater	Yes
Sea turtle, green	<i>Chelonia mydas</i>	Endangered	Saltwater	No
Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
Sea turtle, Kemp's ridley	<i>Lepidochelys kempii</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No
Skink, Blue-tailed Mole	<i>Eumeces egregius lividus</i>	Threatened	Terrestrial	No
Skink, Sand	<i>Neoseps reynoldsi</i>	Threatened	Terrestrial	No
Snake, Atlantic Salt Marsh	<i>Nerodia clarkii taeniata</i>	Threatened	Saltwater, Terrestrial, Brackish	No
Snake, Eastern Indigo	<i>Drymarchon corais couperi</i>	Threatened	Terrestrial	No
Georgia	(34) species:			<u>CH</u>
Amphibian				
Salamander, Flatwoods	<i>Ambystoma cingulatum</i>	Threatened	Freshwater, Vernal pool, Terrestrial	No
Bird				
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Stork, Wood	<i>Mycteria americana</i>	Endangered	Terrestrial	No
Warbler (=Wood), Kirtland's	<i>Dendroica kirtlandii</i>	Endangered	Terrestrial	No
Woodpecker, Red-cockaded	<i>Picoides borealis</i>	Endangered	Terrestrial	No
Conf/cycds				
Torreya, Florida	<i>Torreya taxifolia</i>	Endangered	Terrestrial	No
Dicot				
Amphianthus, Little	<i>Amphianthus pusillus</i>	Threatened	Freshwater	No
Barbara Buttons, Mohr's	<i>Marshallia mohrii</i>	Threatened	Terrestrial	No

Campion, Fringed	<i>Silene polypetala</i>	Endangered	Terrestrial	No
Dropwort, Canby's	<i>Oxypolis canbyi</i>	Endangered	Terrestrial, Freshwater	No
Harperella	<i>Ptilimnium nodosum</i>	Endangered	Freshwater	No
Pitcher-plant, Green	<i>Sarracenia oreophila</i>	Endangered	Terrestrial, Freshwater	No
Pondberry	<i>Lindera melissifolia</i>	Endangered	Terrestrial	No
Rattleweed, Hairy	<i>Baptisia arachnifera</i>	Endangered	Terrestrial	No
Skullcap, Large-flowered	<i>Scutellaria montana</i>	Threatened	Terrestrial	No
Spiraea, Virginia	<i>Spiraea virginiana</i>	Threatened	Terrestrial	No
Sumac, Michaux's	<i>Rhus michauxii</i>	Endangered	Terrestrial	No

Ferns

Quillwort, Black-spored	<i>Isoetes melanospora</i>	Endangered	Vernal pool	No
Quillwort, Mat-forming	<i>Isoetes tegetiformans</i>	Endangered	Vernal pool	No

Mammal

Bat, Gray	<i>Myotis grisescens</i>	Endangered	Subterranean, Terrestrial	No
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes
Bat, Virginia Big-eared	<i>Corynorhinus (=Plecotus) townsendii virginianus</i>	Endangered	Terrestrial, Subterranean	Yes

Monocot

Grass, Tennessee Yellow-eyed	<i>Xyris tennesseensis</i>	Endangered	Terrestrial	No
Pink, Swamp	<i>Helonias bullata</i>	Threatened	Terrestrial, Freshwater	No
Pogonia, Small Whorled	<i>Isotria medeoloides</i>	Threatened	Terrestrial	No
Trillium, Persistent	<i>Trillium persistens</i>	Endangered	Terrestrial	No
Trillium, Relict	<i>Trillium reliquum</i>	Endangered	Terrestrial	No
Water-plantain, Kral's	<i>Sagittaria secundifolia</i>	Threatened	Freshwater	No

Reptile

Sea turtle, green	<i>Chelonia mydas</i>	Endangered	Saltwater	No
Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
Sea turtle, Kemp's ridley	<i>Lepidochelys kempii</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No
Snake, Eastern Indigo	<i>Drymarchon corais couperi</i>	Threatened	Terrestrial	No

Hawaii

(304) species:

CH

Bird

'Akepa, Hawaii	<i>Loxops coccineus coccineus</i>	Endangered	Terrestrial	No
'Akepa, Maui	<i>Loxops coccineus ochraceus</i>	Endangered	Terrestrial	No
'Akia Loa, Kauai (Hemignathus procerus)	<i>Hemignathus procerus</i>	Endangered	Terrestrial	No

'Akia Pola'au (<i>Hemignathus munroi</i>)	<i>Hemignathus munroi</i>	Endangered	Terrestrial	No
Albatross, Short-tailed	<i>Phoebastria (=Diomedea) albatrus</i>	Endangered	Terrestrial, Saltwater	No
Coot, Hawaiian (=Alae keo keo)	<i>Fulica americana alai</i>	Endangered	Terrestrial	No
Creeper, Hawaii	<i>Oreomystis mana</i>	Endangered	Terrestrial	No
Creeper, Molokai (Kakawahie)	<i>Paroreomyza flammea</i>	Endangered	Terrestrial	No
Creeper, Oahu (Alauwahio)	<i>Paroreomyza maculata</i>	Endangered	Terrestrial	No
Crow, Hawaiian ('Alala)	<i>Corvus hawaiiensis</i>	Endangered	Terrestrial	No
Duck, Hawaiian (Koloa)	<i>Anas wyvilliana</i>	Endangered	Freshwater, Terrestrial	No
Duck, Laysan	<i>Anas laysanensis</i>	Endangered	Terrestrial, Freshwater	No
Elepaio, Oahu	<i>Chasiempis sandwichensis ibidis</i>	Endangered	Terrestrial	Yes
Finch, Laysan	<i>Telespyza cantans</i>	Endangered	Terrestrial	No
Finch, Nihoa	<i>Telespyza ultima</i>	Endangered	Terrestrial	No
Goose, Hawaiian (Nene)	<i>Branta (=Nesochen) sandvicensis</i>	Endangered	Terrestrial, Freshwater	No
Hawk, Hawaiian (Io)	<i>Buteo solitarius</i>	Endangered	Terrestrial	No
Honeycreeper, Crested ('Akohekohe)	<i>Palmeria dolei</i>	Endangered	Terrestrial	No
Millerbird, Nihoa	<i>Acrocephalus familiaris kingi</i>	Endangered	Terrestrial	No
Moorhen, Hawaiian Common	<i>Gallinula chloropus sandvicensis</i>	Endangered	Terrestrial	No
Nuku Pu'u	<i>Hemignathus lucidus</i>	Endangered	Terrestrial	No
'O'o, Kauai (=A'a)	<i>Moho braccatus</i>	Endangered	Terrestrial	No
'O'u (Honeycreeper)	<i>Psittirostra psittacea</i>	Endangered	Terrestrial	No
Pali'a	<i>Loxioides bailleui</i>	Endangered	Terrestrial	Yes
Parrotbill, Maui	<i>Pseudonestor xanthophrys</i>	Endangered	Terrestrial	No
Petrel, Hawaiian Dark-rumped	<i>Pterodroma phaeopygia sandwichensis</i>	Endangered	Terrestrial	No
Po'ouli	<i>Melamprosops phaeosoma</i>	Endangered	Terrestrial	No
Shearwater, Newell's Townsend's	<i>Puffinus auricularis newelli</i>	Threatened	Terrestrial, Saltwater	No
Stilt, Hawaiian (=Ae'o)	<i>Himantopus mexicanus knudseni</i>	Endangered	Terrestrial	No
Thrush, Large Kauai	<i>Myadestes myadestinus</i>	Endangered	Terrestrial	No
Thrush, Molokai (O'oma'o)	<i>Myadestes lanaiensis rutha</i>	Endangered	Terrestrial	No
Thrush, Small Kauai (Puaiohi)	<i>Myadestes palmeri</i>	Endangered	Terrestrial	No

Dicot

Abutilon eremitopetalum (ncn)	<i>Abutilon eremitopetalum</i>	Endangered	Terrestrial	Yes
Abutilon sandwicense (ncn)	<i>Abutilon sandwicense</i>	Endangered	Terrestrial	Yes
Achyranthes mutica (ncn)	<i>Achyranthes mutica</i>	Endangered	Terrestrial	Yes
Achyranthes splendens var. rotundata (ncn)	<i>Achyranthes splendens var. rotundata</i>	Endangered	Terrestrial	No
A'e (<i>Zanthoxylum dipetalum</i> var. tomentosum)	<i>Zanthoxylum dipetalum</i> var. tomentosum	Endangered	Terrestrial	Yes

A'e (<i>Zanthoxylum hawaiiense</i>)	<i>Zanthoxylum hawaiiense</i>	Endangered	Terrestrial	Yes
'Aiea (<i>Nothocestrum breviflorum</i>)	<i>Nothocestrum breviflorum</i>	Endangered	Terrestrial	Yes
'Aiea (<i>Nothocestrum peltatum</i>)	<i>Nothocestrum peltatum</i>	Endangered	Terrestrial	Yes
'Akoko (<i>Chamaesyce celastroides</i> var. <i>kaenana</i>)	<i>Chamaesyce celastroides</i> var. <i>kaenana</i>	Endangered	Terrestrial	Yes
'Akoko (<i>Chamaesyce deppeana</i>)	<i>Chamaesyce deppeana</i>	Endangered	Terrestrial	Yes
'Akoko (<i>Chamaesyce herbstii</i>)	<i>Chamaesyce herbstii</i>	Endangered	Terrestrial	Yes
'Akoko (<i>Chamaesyce kuwaleana</i>)	<i>Chamaesyce kuwaleana</i>	Endangered	Terrestrial	Yes
'Akoko (<i>Chamaesyce rockii</i>)	<i>Chamaesyce rockii</i>	Endangered	Terrestrial	Yes
'Akoko (<i>Chamaesyce skottsbergii</i> var. <i>skottsbe</i>)	<i>Chamaesyce skottsbergii</i> var. <i>kalaeloana</i>	Endangered	Terrestrial	No
'Akoko (<i>Euphorbia haeleeleana</i>)	<i>Euphorbia haeleeleana</i>	Endangered	Terrestrial	Yes
Alani (<i>Melicope adscendens</i>)	<i>Melicope adscendens</i>	Endangered	Terrestrial	Yes
Alani (<i>Melicope balloui</i>)	<i>Melicope balloui</i>	Endangered	Terrestrial	Yes
Alani (<i>Melicope haupuensis</i>)	<i>Melicope haupuensis</i>	Endangered	Terrestrial	Yes
Alani (<i>Melicope knudsenii</i>)	<i>Melicope knudsenii</i>	Endangered	Terrestrial	Yes
Alani (<i>Melicope lydgatei</i>)	<i>Melicope lydgatei</i>	Endangered	Terrestrial	Yes
Alani (<i>Melicope mucronulata</i>)	<i>Melicope mucronulata</i>	Endangered	Terrestrial	Yes
Alani (<i>Melicope munroi</i>)	<i>Melicope munroi</i>	Endangered	Terrestrial	No
Alani (<i>Melicope ovalis</i>)	<i>Melicope ovalis</i>	Endangered	Terrestrial	Yes
Alani (<i>Melicope pallida</i>)	<i>Melicope pallida</i>	Endangered	Terrestrial	Yes
Alani (<i>Melicope quadrangularis</i>)	<i>Melicope quadrangularis</i>	Endangered	Terrestrial	No
Alani (<i>Melicope reflexa</i>)	<i>Melicope reflexa</i>	Endangered	Terrestrial	Yes
Alani (<i>Melicope saint-johnii</i>)	<i>Melicope saint-johnii</i>	Endangered	Terrestrial	Yes
Alani (<i>Melicope zahlbruckneri</i>)	<i>Melicope zahlbruckneri</i>	Endangered	Terrestrial	Yes
Alsinidendron obovatum (ncn)	<i>Alsinidendron obovatum</i>	Endangered	Terrestrial	Yes
Alsinidendron trinerve (ncn)	<i>Alsinidendron trinerve</i>	Endangered	Terrestrial	Yes
Alsinidendron viscosum (ncn)	<i>Alsinidendron viscosum</i>	Endangered	Terrestrial	Yes
Amaranthus brownii (ncn)	<i>Amaranthus brownii</i>	Endangered	Terrestrial	Yes
'Anaunau (<i>Lepidium arbuscula</i>)	<i>Lepidium arbuscula</i>	Endangered	Terrestrial	Yes
'Anunu (<i>Sicyos alba</i>)	<i>Sicyos alba</i>	Endangered	Terrestrial	Yes
Aupaka (<i>Isodendron hosakae</i>)	<i>Isodendron hosakae</i>	Endangered	Terrestrial	Yes
Aupaka (<i>Isodendron laurifolium</i>)	<i>Isodendron laurifolium</i>	Endangered	Terrestrial	Yes
Aupaka (<i>Isodendron longifolium</i>)	<i>Isodendron longifolium</i>	Threatened	Terrestrial	Yes
'Awikiwiki (<i>Canavalia molokaiensis</i>)	<i>Canavalia molokaiensis</i>	Endangered	Terrestrial	Yes
'Awiwi (<i>Centaurium sebaeoides</i>)	<i>Centaurium sebaeoides</i>	Endangered	Terrestrial	Yes
'Awiwi (<i>Hedyotis cookiana</i>)	<i>Hedyotis cookiana</i>	Endangered	Terrestrial	Yes
Bonamia menziesii (ncn)	<i>Bonamia menziesii</i>	Endangered	Terrestrial	Yes

Chamaesyce Halemanui (ncn)	<i>Chamaesyce halemanui</i>	Endangered	Terrestrial	Yes
Cyanea undulata (ncn)	<i>Cyanea undulata</i>	Endangered	Terrestrial	Yes
Delissea rhytidisperma (ncn)	<i>Delissea rhytidospema</i>	Endangered	Terrestrial	Yes
Dubautia latifolia (ncn)	<i>Dubautia latifolia</i>	Endangered	Terrestrial	Yes
Dubautia pauciflora (ncn)	<i>Dubautia pauciflora</i>	Endangered	Terrestrial	Yes
Geranium, Hawaiian Red-flowered	<i>Geranium arboreum</i>	Endangered	Terrestrial	Yes
Gouania hillebrandii (ncn)	<i>Gouania hillebrandii</i>	Endangered	Terrestrial	Yes
Gouania meyerii (ncn)	<i>Gouania meyerii</i>	Endangered	Terrestrial	Yes
Gouania vitifolia (ncn)	<i>Gouania vitifolia</i>	Endangered	Terrestrial	Yes
Haha (Cyanea acuminata)	<i>Cyanea acuminata</i>	Endangered	Terrestrial	Yes
Haha (Cyanea asarifolia)	<i>Cyanea asarifolia</i>	Endangered	Terrestrial	Yes
Haha (Cyanea copelandii ssp. copelandii)	<i>Cyanea copelandii ssp. copelandii</i>	Endangered	Terrestrial	No
Haha (Cyanea copelandii ssp. haleakalaensis)	<i>Cyanea copelandii ssp. haleakalaensis</i>	Endangered	Terrestrial	Yes
Haha (Cyanea Crispa) (=Rollandia crispa)	<i>Cyanea (=Rollandia) crispa</i>	Endangered	Terrestrial	Yes
Haha (Cyanea dunbarii)	<i>Cyanea dunbarii</i>	Endangered	Terrestrial	Yes
Haha (Cyanea glabra)	<i>Cyanea glabra</i>	Endangered	Terrestrial	Yes
Haha (Cyanea grimesiana ssp. grimesiana)	<i>Cyanea grimesiana ssp. grimesiana</i>	Endangered	Terrestrial	Yes
Haha (Cyanea grimesiana ssp. obatae)	<i>Cyanea grimesiana ssp. obatae</i>	Endangered	Terrestrial	Yes
Haha (Cyanea hamatiflora ssp. carlsonii)	<i>Cyanea hamatiflora carlsonii</i>	Endangered	Terrestrial	Yes
Haha (Cyanea hamatiflora ssp. hamatiflora)	<i>Cyanea hamatiflora ssp. hamatiflora</i>	Endangered	Terrestrial	Yes
Haha (Cyanea humboldtiana)	<i>Cyanea humboldtiana</i>	Endangered	Terrestrial	Yes
Haha (Cyanea koolauensis)	<i>Cyanea koolauensis</i>	Endangered	Terrestrial	Yes
Haha (Cyanea longiflora)	<i>Cyanea longiflora</i>	Endangered	Terrestrial	Yes
Haha (Cyanea Macrosteugia var. gibsonii)	<i>Cyanea macrosteugia ssp. gibsonii</i>	Endangered	Terrestrial	No
Haha (Cyanea mannii)	<i>Cyanea mannii</i>	Endangered	Terrestrial	Yes
Haha (Cyanea mceldowneyi)	<i>Cyanea mceldowneyi</i>	Endangered	Terrestrial	Yes
Haha (Cyanea pinnatifida)	<i>Cyanea pinnatifida</i>	Endangered	Terrestrial	Yes
Haha (Cyanea platyphylla)	<i>Cyanea platyphylla</i>	Endangered	Terrestrial	Yes
Haha (Cyanea procera)	<i>Cyanea procera</i>	Endangered	Terrestrial	Yes
Haha (Cyanea recta)	<i>Cyanea recta</i>	Threatened	Terrestrial	Yes
Haha (Cyanea remyi)	<i>Cyanea remyi</i>	Endangered	Terrestrial	Yes
Haha (Cyanea shipmanii)	<i>Cyanea shipmanii</i>	Endangered	Terrestrial	Yes
Haha (Cyanea stictophylla)	<i>Cyanea stictophylla</i>	Endangered	Terrestrial	Yes

Haha (Cyanea St-Johnii) (=Rollandia St-Johnii)	<i>Cyanea st-johnii</i>	Endangered	Terrestrial	Yes
Haha (Cyanea superba)	<i>Cyanea superba</i>	Endangered	Terrestrial	Yes
Ha'Iwale (Cyrtandra crenata)	<i>Cyrtandra crenata</i>	Endangered	Terrestrial	No
Ha'Iwale (Cyrtandra dentata)	<i>Cyrtandra dentata</i>	Endangered	Terrestrial	Yes
Ha'Iwale (Cyrtandra giffardii)	<i>Cyrtandra giffardii</i>	Endangered	Terrestrial	Yes
Ha'Iwale (Cyrtandra limahuliensis)	<i>Cyrtandra limahuliensis</i>	Threatened	Terrestrial	Yes
Ha'Iwale (Cyrtandra munroi)	<i>Cyrtandra munroi</i>	Endangered	Terrestrial	Yes
Ha'Iwale (Cyrtandra polyantha)	<i>Cyrtandra polyantha</i>	Endangered	Terrestrial	Yes
Ha'Iwale (Cyrtandra subumbellata)	<i>Cyrtandra subumbellata</i>	Endangered	Terrestrial	Yes
Ha'Iwale (Cyrtandra tintinnabula)	<i>Cyrtandra tintinnabula</i>	Endangered	Terrestrial	Yes
Ha'Iwale (Cyrtandra viridiflora)	<i>Cyrtandra viridiflora</i>	Endangered	Terrestrial	Yes
Haplostachys Haplostachya (ncn)	<i>Haplostachys haplostachya</i>	Endangered	Terrestrial	No
Hau Kauhiwi (Hibiscadelphus woodii)	<i>Hibiscadelphus woodii</i>	Endangered	Terrestrial	Yes
Hau Kuahiwi (Hibiscadelphus distans)	<i>Hibiscadelphus distans</i>	Endangered	Terrestrial	No
Heau (Exocarpos luteolus)	<i>Exocarpos luteolus</i>	Endangered	Terrestrial	Yes
Hedyotis degeneri (ncn)	<i>Hedyotis degeneri</i>	Endangered	Terrestrial	Yes
Hedyotis parvula (ncn)	<i>Hedyotis parvula</i>	Endangered	Terrestrial	Yes
Hedyotis St.-Johnii (ncn)	<i>Hedyotis st-johnii</i>	Endangered	Terrestrial	Yes
Hesperomannia arborescens (ncn)	<i>Hesperomannia arborescens</i>	Endangered	Terrestrial	Yes
Hesperomannia arbuscula (ncn)	<i>Hesperomannia arbuscula</i>	Endangered	Terrestrial	Yes
Hesperomannia lydgatei (ncn)	<i>Hesperomannia lydgatei</i>	Endangered	Terrestrial	Yes
Hibiscus, Clay's	<i>Hibiscus clayi</i>	Endangered	Terrestrial	Yes
Holei (Ochrosia kilaueaensis)	<i>Ochrosia kilaueaensis</i>	Endangered	Terrestrial	No
Iliu (Wilkesia hobbii)	<i>Wilkesia hobbii</i>	Endangered	Terrestrial	Yes
Kamakahala (Labordia cyrtandrae)	<i>Labordia cyrtandrae</i>	Endangered	Terrestrial	Yes
Kamakahala (Labordia lydgatei)	<i>Labordia lydgatei</i>	Endangered	Terrestrial	Yes
Kamakahala (Labordia tinifolia var. lanaiensis)	<i>Labordia tinifolia var. lanaiensis</i>	Endangered	Terrestrial	No
Kamakahala (Labordia tinifolia var. wahiawaensis)	<i>Labordia tinifolia var. wahiawaensis</i>	Endangered	Terrestrial	Yes
Kamakahala (Labordia triflora)	<i>Labordia triflora</i>	Endangered	Terrestrial	No
Kanaloa kahoolawensis (ncn)	<i>Kanaloa kahoolawensis</i>	Endangered	Terrestrial	Yes
Kauila (Colubrina oppositifolia)	<i>Colubrina oppositifolia</i>	Endangered	Terrestrial	Yes
Kaulu (Pteralyxia kauaiensis)	<i>Pteralyxia kauaiensis</i>	Endangered	Terrestrial	Yes
Kio'Ele (Hedyotis coriacea)	<i>Hedyotis coriacea</i>	Endangered	Terrestrial	Yes
Kiponapona (Phyllostegia racemosa)	<i>Phyllostegia racemosa</i>	Endangered	Terrestrial	Yes
Koki'o (Kokia drynarioides)	<i>Kokia drynarioides</i>	Endangered	Terrestrial	Yes
Koki'o (Kokia kauaiensis)	<i>Kokia kauaiensis</i>	Endangered	Terrestrial	Yes

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Koki'o Ke'oke'o (Hibiscus amottianus ssp. immaculatus)	<i>Hibiscus amottianus ssp. immaculatus</i>	Endangered	Terrestrial	Yes
Koki'o Ke'oke'o (Hibiscus waimeae ssp. hanneriae)	<i>Hibiscus waimeae ssp. hanneriae</i>	Endangered	Terrestrial	Yes
Kolea (Myrsine juddii)	<i>Myrsine juddii</i>	Endangered	Terrestrial	Yes
Kolea (Myrsine linearifolia)	<i>Myrsine linearifolia</i>	Threatened	Terrestrial	Yes
Ko'oko'olau (Bidens micrantha ssp. kalealaha)	<i>Bidens micrantha ssp. kalealaha</i>	Endangered	Terrestrial	Yes
Ko'oko'olau (Bidens wiebkei)	<i>Bidens wiebkei</i>	Endangered	Terrestrial	Yes
Ko'olua'ula (Abutilon menziesii)	<i>Abutilon menziesii</i>	Endangered	Terrestrial	No
Kopa (Hedyotis schlechtendahlana var. remyi)	<i>Hedyotis schlechtendahlana var. remyi</i>	Endangered	Terrestrial	No
Kuawawaenuhu (Alsinidendron lychnoides)	<i>Alsinidendron lychnoides</i>	Endangered	Terrestrial	Yes
Kulu'i (Nototrichium humile)	<i>Nototrichium humile</i>	Endangered	Terrestrial	Yes
Laukahi Kuahiwi (Plantago hawaiiensis)	<i>Plantago hawaiiensis</i>	Endangered	Terrestrial	Yes
Laukahi Kuahiwi (Plantago princeps)	<i>Plantago princeps</i>	Endangered	Terrestrial	Yes
Laulihilihi (Schiedea stellarioides)	<i>Schiedea stellarioides</i>	Endangered	Terrestrial	Yes
Lipochaeta venosa (ncn)	<i>Lipochaeta venosa</i>	Endangered	Terrestrial	No
Lobelia monostachya (ncn)	<i>Lobelia monostachya</i>	Endangered	Terrestrial	Yes
Lobelia niihauensis (ncn)	<i>Lobelia niihauensis</i>	Endangered	Terrestrial	Yes
Lobelia oahuensis (ncn)	<i>Lobelia oahuensis</i>	Endangered	Terrestrial	Yes
Lysimachia filifolia (ncn)	<i>Lysimachia filifolia</i>	Endangered	Terrestrial	Yes
Lysimachia lydgatei (ncn)	<i>Lysimachia lydgatei</i>	Endangered	Terrestrial	Yes
Lysimachia maxima (ncn)	<i>Lysimachia maxima</i>	Endangered	Terrestrial	Yes
Mahoe (Alectryon macrococcus)	<i>Alectryon macrococcus</i>	Endangered	Terrestrial	Yes
Makou (Peucedanum sandwicense)	<i>Peucedanum sandwicense</i>	Threatened	Terrestrial	Yes
Ma'o Hau Hele (Hibiscus brackenridgei)	<i>Hibiscus brackenridgei</i>	Endangered	Terrestrial	Yes
Ma'oli'oli (Schiedea apokremnos)	<i>Schiedea apokremnos</i>	Endangered	Terrestrial	Yes
Ma'oli'oli (Schiedea kealiae)	<i>Schiedea kealiae</i>	Endangered	Terrestrial	Yes
Mapele (Cyrtandra cyaneoides)	<i>Cyrtandra cyaneoides</i>	Endangered	Terrestrial	Yes
Mehamehame (Flueggea neowawraea)	<i>Flueggea neowawraea</i>	Endangered	Terrestrial	Yes
Munroidendron racemosum (ncn)	<i>Munroidendron racemosum</i>	Endangered	Terrestrial	Yes
Na'ena'e (Dubautia herbostobatae)	<i>Dubautia herbostobatae</i>	Endangered	Terrestrial	Yes
Na'ena'e (Dubautia plantaginea ssp. humilis)	<i>Dubautia plantaginea ssp. humilis</i>	Endangered	Terrestrial	Yes
Nani Wai'ale'ale (Viola kauaiensis var. wahiawaensis)	<i>Viola kauaiensis var. wahiawaensis</i>	Endangered	Terrestrial	Yes
Nanu (Gardenia mannii)	<i>Gardenia mannii</i>	Endangered	Terrestrial	Yes

Na'u (<i>Gardenia brighamii</i>)	<i>Gardenia brighamii</i>	Endangered	Terrestrial	No
Naupaka, Dwarf (<i>Scaevola coriacea</i>)	<i>Scaevola coriacea</i>	Endangered	Terrestrial	No
Nehe (<i>Lipochaeta fauriei</i>)	<i>Lipochaeta fauriei</i>	Endangered	Terrestrial	Yes
Nehe (<i>Lipochaeta kamolensis</i>)	<i>Lipochaeta kamolensis</i>	Endangered	Terrestrial	Yes
Nehe (<i>Lipochaeta lobata</i> var. <i>leptophylla</i>)	<i>Lipochaeta lobata</i> var. <i>leptophylla</i>	Endangered	Terrestrial	Yes
Nehe (<i>Lipochaeta micrantha</i>)	<i>Lipochaeta micrantha</i>	Endangered	Terrestrial	Yes
Nehe (<i>Lipochaeta tenuifolia</i>)	<i>Lipochaeta tenuifolia</i>	Endangered	Terrestrial	Yes
Nehe (<i>Lipochaeta waimeaensis</i>)	<i>Lipochaeta waimeaensis</i>	Endangered	Terrestrial	Yes
Neraudia angulata (ncn)	<i>Neraudia angulata</i>	Endangered	Terrestrial	Yes
Neraudia ovata (ncn)	<i>Neraudia ovata</i>	Endangered	Terrestrial	Yes
Neraudia sericea (ncn)	<i>Neraudia sericea</i>	Endangered	Terrestrial	Yes
Nioi (<i>Eugenia koolauensis</i>)	<i>Eugenia koolauensis</i>	Endangered	Terrestrial	Yes
Nohōanu (<i>Geranium multiflorum</i>)	<i>Geranium multiflorum</i>	Endangered	Terrestrial	Yes
'Oha (<i>Delissea rivularis</i>)	<i>Delissea rivularis</i>	Endangered	Terrestrial	Yes
'Oha (<i>Delissea subcordata</i>)	<i>Delissea subcordata</i>	Endangered	Terrestrial	Yes
'Oha (<i>Delissea undulata</i>)	<i>Delissea undulata</i>	Endangered	Terrestrial	Yes
'Oha (<i>Lobelia gaudichaudii</i> koolauensis)	<i>Lobelia gaudichaudii</i> ssp. <i>koolauensis</i>	Endangered	Terrestrial	Yes
'Oha Wai (<i>Clermontia drepanomorpha</i>)	<i>Clermontia drepanomorpha</i>	Endangered	Terrestrial	Yes
'Oha Wai (<i>Clermontia lindseyana</i>)	<i>Clermontia lindseyana</i>	Endangered	Terrestrial	Yes
'Oha Wai (<i>Clermontia oblongifolia</i> ssp. <i>brevipes</i>)	<i>Clermontia oblongifolia</i> ssp. <i>brevipes</i>	Endangered	Terrestrial	Yes
'Oha Wai (<i>Clermontia oblongifolia</i> ssp. <i>mauiensis</i>)	<i>Clermontia oblongifolia</i> ssp. <i>mauiensis</i>	Endangered	Terrestrial	Yes
'Oha Wai (<i>Clermontia peleana</i>)	<i>Clermontia peleana</i>	Endangered	Terrestrial	Yes
'Oha Wai (<i>Clermontia pyrularia</i>)	<i>Clermontia pyrularia</i>	Endangered	Terrestrial	Yes
'Oha Wai (<i>Clermontia samuelii</i>)	<i>Clermontia samuelii</i>	Endangered	Terrestrial	Yes
'Ohai (<i>Sesbania tomentosa</i>)	<i>Sesbania tomentosa</i>	Endangered	Terrestrial	Yes
'Ohe'ohe (<i>Tetraplasandra gymnocarpa</i>)	<i>Tetraplasandra gymnocarpa</i>	Endangered	Terrestrial	Yes
'Olulu (<i>Brighamia insignis</i>)	<i>Brighamia insignis</i>	Endangered	Terrestrial	Yes
Opuhe (<i>Urera kaalae</i>)	<i>Urera kaalae</i>	Endangered	Terrestrial	Yes
Pamakani (<i>Viola chamissoniana</i> ssp. <i>chamissoniana</i>)	<i>Viola chamissoniana</i> ssp. <i>chamissoniana</i>	Endangered	Terrestrial	Yes
Phyllostegia hirsuta (ncn)	<i>Phyllostegia hirsuta</i>	Endangered	Terrestrial	Yes
Phyllostegia kaalaensis (ncn)	<i>Phyllostegia kaalaensis</i>	Endangered	Terrestrial	Yes
Phyllostegia knudsenii (ncn)	<i>Phyllostegia knudsenii</i>	Endangered	Terrestrial	Yes
Phyllostegia mannii (ncn)	<i>Phyllostegia mannii</i>	Endangered	Terrestrial	Yes
Phyllostegia mollis (ncn)	<i>Phyllostegia mollis</i>	Endangered	Terrestrial	Yes

Phyllostegia parviflora (ncn)	<i>Phyllostegia parviflora</i>	Endangered	Terrestrial	Yes
Phyllostegia velutina (ncn)	<i>Phyllostegia velutina</i>	Endangered	Terrestrial	Yes
Phyllostegia waimeae (ncn)	<i>Phyllostegia waimeae</i>	Endangered	Terrestrial	Yes
Phyllostegia warshaueri (ncn)	<i>Phyllostegia warshaueri</i>	Endangered	Terrestrial	Yes
Phyllostegia wawrana (ncn)	<i>Phyllostegia wawrana</i>	Endangered	Terrestrial	Yes
Pilo (<i>Hedyotis mannii</i>)	<i>Hedyotis mannii</i>	Endangered	Terrestrial	Yes
Po'e (<i>Portulaca sclerocarpa</i>)	<i>Portulaca sclerocarpa</i>	Endangered	Terrestrial	Yes
Popolo 'Aiakeakua (<i>Solanum sandwicense</i>)	<i>Solanum sandwicense</i>	Endangered	Terrestrial	Yes
Popolo Ku Mai (<i>Solanum incompletum</i>)	<i>Solanum incompletum</i>	Endangered	Terrestrial	Yes
Pua'ala (<i>Brighamia rockii</i>)	<i>Brighamia rockii</i>	Endangered	Terrestrial	Yes
Remya kauaiensis (ncn)	<i>Remya kauaiensis</i>	Endangered	Terrestrial	Yes
Remya montgomeryi (ncn)	<i>Remya montgomeryi</i>	Endangered	Terrestrial	Yes
Remya, Maui	<i>Remya mauensis</i>	Endangered	Terrestrial	Yes
Sandalwood, Lanai (=Iliahii)	<i>Santalum freycinetianum</i> var. <i>lanaiense</i>	Endangered	Terrestrial	No
Sanicula mariversa (ncn)	<i>Sanicula mariversa</i>	Endangered	Terrestrial	Yes
Sanicula purpurea (ncn)	<i>Sanicula purpurea</i>	Endangered	Terrestrial	Yes
Schiedea haleakalensis (ncn)	<i>Schiedea haleakalensis</i>	Endangered	Terrestrial	Yes
Schiedea helleri (ncn)	<i>Schiedea helleri</i>	Endangered	Terrestrial	Yes
Schiedea hookeri (ncn)	<i>Schiedea hookeri</i>	Endangered	Terrestrial	Yes
Schiedea kaalae (ncn)	<i>Schiedea kaalae</i>	Endangered	Terrestrial	Yes
Schiedea kauaiensis (ncn)	<i>Schiedea kauaiensis</i>	Endangered	Terrestrial	Yes
Schiedea lydgatei (ncn)	<i>Schiedea lydgatei</i>	Endangered	Terrestrial	Yes
Schiedea membranacea (ncn)	<i>Schiedea membranacea</i>	Endangered	Terrestrial	Yes
Schiedea nuttallii (ncn)	<i>Schiedea nuttallii</i>	Endangered	Terrestrial	Yes
Schiedea sarmentosa (ncn)	<i>Schiedea sarmentosa</i>	Endangered	Terrestrial	Yes
Schiedea spergulina var. leiopoda (ncn)	<i>Schiedea spergulina</i> var. <i>leiopoda</i>	Endangered	Terrestrial	Yes
Schiedea spergulina var. spergulina (ncn)	<i>Schiedea spergulina</i> var. <i>spergulina</i>	Threatened	Terrestrial	Yes
Schiedea verticillata (ncn)	<i>Schiedea verticillata</i>	Endangered	Terrestrial	Yes
Schiedea, Diamond Head (<i>Schiedea adamantis</i>)	<i>Schiedea adamantis</i>	Endangered	Terrestrial	No
Silene alexandri (ncn)	<i>Silene alexandri</i>	Endangered	Terrestrial	Yes
Silene hawaiiensis (ncn)	<i>Silene hawaiiensis</i>	Threatened	Terrestrial	Yes
Silene lanceolata (ncn)	<i>Silene lanceolata</i>	Endangered	Terrestrial	Yes
Silene perlmanii (ncn)	<i>Silene perlmanii</i>	Endangered	Terrestrial	Yes
Silversword, Haleakala ('Ahinahina)	<i>Argyroxiphium sandwicense</i> ssp. <i>macrocephalum</i>	Threatened	Terrestrial	Yes

Silversword, Ka'u (<i>Argyroxiphium kauense</i>)	<i>Argyroxiphium kauense</i>	Endangered	Terrestrial	Yes
Silversword, Mauna Kea ('Ahinahina)	<i>Argyroxiphium sandwicense</i> ssp. <i>sandwicense</i>	Endangered	Terrestrial	No
<i>Spermolepis hawaiiensis</i> (ncn)	<i>Spermolepis hawaiiensis</i>	Endangered	Terrestrial	Yes
<i>Stenogyne angustifolia</i> (ncn)	<i>Stenogyne angustifolia</i> var. <i>angustifolia</i>	Endangered	Terrestrial	No
<i>Stenogyne bifida</i> (ncn)	<i>Stenogyne bifida</i>	Endangered	Terrestrial	Yes
<i>Stenogyne campanulata</i> (ncn)	<i>Stenogyne campanulata</i>	Endangered	Terrestrial	Yes
<i>Stenogyne kanehoana</i> (ncn)	<i>Stenogyne kanehoana</i>	Endangered	Terrestrial	Yes
<i>Tetramolopium arenarium</i> (ncn)	<i>Tetramolopium arenarium</i>	Endangered	Terrestrial	No
<i>Tetramolopium capillare</i> (ncn)	<i>Tetramolopium capillare</i>	Endangered	Terrestrial	Yes
<i>Tetramolopium filiforme</i> (ncn)	<i>Tetramolopium filiforme</i>	Endangered	Terrestrial	Yes
<i>Tetramolopium lepidotum</i> ssp. <i>lepidotum</i> (ncn)	<i>Tetramolopium lepidotum</i> ssp. <i>lepidotum</i>	Endangered	Terrestrial	Yes
<i>Tetramolopium remyi</i> (ncn)	<i>Tetramolopium remyi</i>	Endangered	Terrestrial	Yes
<i>Tetramolopium rockii</i> (ncn)	<i>Tetramolopium rockii</i>	Threatened	Coastal (neritic), Terrestrial	Yes
<i>Trematolobelia singularis</i> (ncn)	<i>Trematolobelia singularis</i>	Endangered	Terrestrial	Yes
Uhiuhi (<i>Caesalpinia kavaensis</i>)	<i>Caesalpinia kavaensis</i>	Endangered	Terrestrial	No
Ulihi (<i>Phyllostegia glabra</i> var. <i>lanaiensis</i>)	<i>Phyllostegia glabra</i> var. <i>lanaiensis</i>	Endangered	Terrestrial	No
Vetch, Hawaiian (<i>Vicia menziesii</i>)	<i>Vicia menziesii</i>	Endangered	Terrestrial	No
Vignā o-wahuensis (ncn)	<i>Vigna o-wahuensis</i>	Endangered	Terrestrial	Yes
<i>Viola helenae</i> (ncn)	<i>Viola helenae</i>	Endangered	Terrestrial	Yes
<i>Viola lanaiensis</i> (ncn)	<i>Viola lanaiensis</i>	Endangered	Terrestrial	No
<i>Viola oahuensis</i> (ncn)	<i>Viola oahuensis</i>	Endangered	Terrestrial	Yes
Wahine Noho Kula (<i>Isodendron pyriforme</i>)	<i>Isodendron pyriforme</i>	Endangered	Terrestrial	Yes
<i>Xylosma crenatum</i> (ncn)	<i>Xylosma crenatum</i>	Endangered	Terrestrial	Yes
Ferns				
<i>Asplenium fragile</i> var. <i>insulare</i> (ncn)	<i>Asplenium fragile</i> var. <i>insulare</i>	Endangered	Terrestrial	Yes
<i>Diellia erecta</i> (ncn)	<i>Diellia erecta</i>	Endangered	Terrestrial	Yes
<i>Diellia falcata</i> (ncn)	<i>Diellia falcata</i>	Endangered	Terrestrial	Yes
<i>Diellia pallida</i> (ncn)	<i>Diellia pallida</i>	Endangered	Terrestrial	Yes
<i>Diellia unisora</i> (ncn)	<i>Diellia unisora</i>	Endangered	Terrestrial	Yes
<i>Diplazium molokaiense</i> (ncn)	<i>Diplazium molokaiense</i>	Endangered	Terrestrial	Yes
Fern, Pendant Kihī (<i>Adenophorus periens</i>)	<i>Adenophorus periens</i>	Endangered	Terrestrial	Yes
'Ihi'Ihi (<i>Marsilea villosa</i>)	<i>Marsilea villosa</i>	Endangered	Vernal pool, Terrestrial	Yes
Pauoa (<i>Ctenitis squamigera</i>)	<i>Ctenitis squamigera</i>	Endangered	Terrestrial	Yes

Pteris lidgatei (ncn)	<i>Pteris lidgatei</i>	Endangered	Terrestrial	Yes
Wawae'Iole (Phlegmariurus (=Huperzia) mannii)	<i>Huperzia mannii</i>	Endangered	Terrestrial	Yes
Wawae'Iole (Phlegmariurus (=Lycopodium) nutans)	<i>Lycopodium (=Phlegmariurus) nutans</i>	Endangered	Terrestrial	Yes

Mammal

Bat, Hawaiian Hoary	<i>Lasiurus cinereus semotus</i>	Endangered	Terrestrial, Subterranean	No
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Monocot

Bluegrass, Hawaiian	<i>Poa sandwicensis</i>	Endangered	Terrestrial	Yes
Bluegrass, Mann's (Poa mannii)	<i>Poa mannii</i>	Endangered	Terrestrial	Yes
Gahnia Lanaiensis (ncn)	<i>Gahnia lanaiensis</i>	Endangered	Terrestrial	No
Grass, Fosberg's Love	<i>Eragrostis fosbergii</i>	Endangered	Terrestrial	Yes
Hala Pepe (Pleomele hawaiiensis)	<i>Pleomele hawaiiensis</i>	Endangered	Terrestrial	Yes
Hilo Ischaemum (Ischaemum byrone)	<i>Ischaemum byrone</i>	Endangered	Terrestrial	Yes
Kamanomano (Cenchrus agrimonioides)	<i>Cenchrus agrimonioides</i>	Endangered	Terrestrial	Yes
Lau'ehu (Panicum niuhauense)	<i>Panicum niuhauense</i>	Endangered	Terrestrial	Yes
Lo'ulu (Pritchardia affinis)	<i>Pritchardia affinis</i>	Endangered	Terrestrial	No
Lo'ulu (Pritchardia kaalae)	<i>Pritchardia kaalae</i>	Endangered	Terrestrial	No
Lo'ulu (Pritchardia munroi)	<i>Pritchardia munroi</i>	Endangered	Terrestrial	Yes
Lo'ulu (Pritchardia napaliensis)	<i>Pritchardia napaliensis</i>	Endangered	Terrestrial	No
Lo'ulu (Pritchardia remota)	<i>Pritchardia remota</i>	Endangered	Terrestrial	Yes
Lo'ulu (Pritchardia schattaueri)	<i>Pritchardia schattaueri</i>	Endangered	Terrestrial	No
Lo'ulu (Pritchardia viscosa)	<i>Pritchardia viscosa</i>	Endangered	Terrestrial	No
Mariscus fauriei (ncn)	<i>Mariscus fauriei</i>	Endangered	Terrestrial	Yes
Mariscus pennatifolius (ncn)	<i>Mariscus pennatifolius</i>	Endangered	Terrestrial	Yes
Panicgrass, Carter's (Panicum fauriei var. carteri)	<i>Panicum fauriei</i> var. <i>carteri</i>	Endangered	Terrestrial	Yes
Platanthera holochila (ncn)	<i>Platanthera holochila</i>	Endangered	Terrestrial	Yes
Poa siphonoglossa (ncn)	<i>Poa siphonoglossa</i>	Endangered	Terrestrial	Yes
Pu'uka'a (Cyperus trachysanthos)	<i>Cyperus trachysanthos</i>	Endangered	Terrestrial	Yes
Wahane (Pritchardia aylmer-robinsonii)	<i>Pritchardia aylmer-robinsonii</i>	Endangered	Terrestrial	No

Reptile

Sea turtle, green	<i>Chelonia mydas</i>	Endangered	Saltwater	No
Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No

Idaho

(7) species:

CH

Bird

Crane, Whooping	<i>Grus americana</i>	Endangered	Terrestrial, Freshwater	Yes
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Dicot

Catchfly, Spalding's	<i>Silene spaldingii</i>	Threatened	Terrestrial	No
Four-o'clock, Macfarlane's	<i>Mirabilis macfarlanei</i>	Threatened	Terrestrial	No
Howellia, Water	<i>Howellia aquatilis</i>	Threatened	Freshwater	No

Mammal

Bear, Grizzly	<i>Ursus arctos horribilis</i>	Threatened	Terrestrial	No
Caribou, Woodland	<i>Rangifer tarandus caribou</i>	Endangered	Terrestrial	No
Squirrel, Northern Idaho Ground	<i>Spermophilus brunneus brunneus</i>	Threatened	Terrestrial	No

Illinois

(13) species:

CH

Bird

Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Tern, Interior (population) Least	<i>Sterna antillarum</i>	Endangered	Terrestrial	No

Dicot

Aster, Decurrent False	<i>Boltonia decurrens</i>	Threatened	Terrestrial, Freshwater	No
Clover, Leafy Prairie	<i>Dalea foliosa</i>	Endangered	Terrestrial	No
Clover, Prairie Bush	<i>Lespedeza leptostachya</i>	Threatened	Terrestrial	No
Daisy, Lakeside	<i>Hymenoxys herbacea</i>	Threatened	Freshwater	No
Milkweed, Mead's	<i>Asclepias meadii</i>	Threatened	Terrestrial	No
Potato-bean, Price's	<i>Apios priceana</i>	Threatened	Terrestrial	No
Thistle, Pitcher's	<i>Cirsium pitcheri</i>	Threatened	Terrestrial	No

Mammal

Bat, Gray	<i>Myotis grisescens</i>	Endangered	Subterranean, Terrestrial	No
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes

Monocot

Orchid, Eastern Prairie Fringed	<i>Platanthera leucophaea</i>	Threatened	Terrestrial	No
Pogonia, Small Whorled	<i>Isotria medeoloides</i>	Threatened	Terrestrial	No

Indiana

(10) species:

CH

Bird

Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Tern, Interior (population) Least	<i>Sterna antillarum</i>	Endangered	Terrestrial	No

Dicot

Clover, Running Buffalo	<i>Trifolium stoloniferum</i>	Endangered	Terrestrial	No
Goldenrod, Short's	<i>Solidago shortii</i>	Endangered	Terrestrial	No
Milkweed, Mead's	<i>Asclepias meadii</i>	Threatened	Terrestrial	No

Thistle, Pitcher's	<i>Cirsium pitcheri</i>	Threatened	Terrestrial	No
Mammal				
Bat, Gray	<i>Myotis grisescens</i>	Endangered	Subterranean, Terrestrial	No
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes
Monocot				
Orchid, Eastern Prairie Fringed	<i>Platanthera leucophaea</i>	Threatened	Terrestrial	No
Reptile				
Snake, Northern Copperbelly Water	<i>Nerodia erythrogaster neglecta</i>	Threatened	Freshwater, Terrestrial	No
Iowa (9) species:				
Bird				
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Tern, Interior (population) Least	<i>Sterna antillarum</i>	Endangered	Terrestrial	No
Dicot				
Clover, Prairie Bush	<i>Lespedeza leptostachya</i>	Threatened	Terrestrial	No
Milkweed, Mead's	<i>Asclepias meadii</i>	Threatened	Terrestrial	No
Monkshood, Northern Wild	<i>Aconitum noveboracense</i>	Threatened	Terrestrial	No
Ferns				
Fern, American hart's-tongue	<i>Asplenium scolopendrium var. americanum</i>	Threatened	Terrestrial	No
Mammal				
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes
Monocot				
Orchid, Eastern Prairie Fringed	<i>Platanthera leucophaea</i>	Threatened	Terrestrial	No
Orchid, Western Prairie Fringed	<i>Platanthera praeclara</i>	Threatened	Terrestrial	No
Kansas (7) species:				
Bird				
Crane, Whooping	<i>Grus americana</i>	Endangered	Terrestrial, Freshwater	Yes
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Tern, Interior (population) Least	<i>Sterna antillarum</i>	Endangered	Terrestrial	No
Dicot				
Milkweed, Mead's	<i>Asclepias meadii</i>	Threatened	Terrestrial	No
Mammal				
Bat, Gray	<i>Myotis grisescens</i>	Endangered	Subterranean, Terrestrial	No
Ferret, Black-footed	<i>Mustela nigripes</i>	Endangered	Terrestrial	No
Monocot				

Orchid, Western Prairie Fringed	<i>Platanthera praeclara</i>	Threatened	Terrestrial	No
Kentucky	(19) species:			<u>CH</u>
Bird				
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Tern, Interior (population) Least	<i>Sterna antillarum</i>	Endangered	Terrestrial	No
Warbler (=Wood), Kirtland's	<i>Dendroica kirtlandii</i>	Endangered	Terrestrial	No
Warbler, Bachman's	<i>Vermivora bachmanii</i>	Endangered	Terrestrial	No
Woodpecker, Ivory-billed	<i>Campephilus principalis</i>	Endangered	Terrestrial	No
Woodpecker, Red-cockaded	<i>Picoides borealis</i>	Endangered	Terrestrial	No
Dicot				
Chaffseed, American	<i>Schwalbea americana</i>	Endangered	Terrestrial	No
Clover, Running Buffalo	<i>Trifolium stoloniferum</i>	Endangered	Terrestrial	No
Goldenrod, Short's	<i>Solidago shortii</i>	Endangered	Terrestrial	No
Goldenrod, White-haired	<i>Solidago albopilosa</i>	Threatened	Terrestrial	No
Potato-bean, Price's	<i>Apios priceana</i>	Threatened	Terrestrial	No
Rock-cress, Large (=Braun's)	<i>Arabis perstellata</i> E. L. Braun var. <i>ampla</i> Rollins	Endangered	Terrestrial	Yes
Rock-cress, Small	<i>Arabis perstellata</i> E. L. Braun var. <i>perstellata</i> Fernald	Endangered	Terrestrial	Yes
Rosemary, Cumberland	<i>Conradina verticillata</i>	Threatened	Terrestrial	No
Sandwort, Cumberland	<i>Arenaria cumberlandensis</i>	Endangered	Terrestrial	No
Spiraea, Virginia	<i>Spiraea virginiana</i>	Threatened	Terrestrial	No
Mammal				
Bat, Gray	<i>Myotis grisescens</i>	Endangered	Subterranean, Terrestrial	No
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes
Bat, Virginia Big-eared	<i>Corynorhinus</i> (=Plecotus) <i>townsendii virginianus</i>	Endangered	Terrestrial, Subterranean	Yes
Louisiana	(15) species:			<u>CH</u>
Bird				
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Tern, California Least	<i>Sterna antillarum browni</i>	Endangered	Terrestrial	No
Tern, Interior (population) Least	<i>Sterna antillarum</i>	Endangered	Terrestrial	No
Woodpecker, Red-cockaded	<i>Picoides borealis</i>	Endangered	Terrestrial	No
Dicot				
Chaffseed, American	<i>Schwalbea americana</i>	Endangered	Terrestrial	No
Fruit, Earth (=geocarpon)	<i>Geocarpon minimum</i>	Threatened	Terrestrial	No
Ferns				

Quillwort, Louisiana	<i>Isoetes louisianensis</i>	Endangered	Freshwater, Terrestrial	No
Mammal				
Bear, Louisiana Black	<i>Ursus americanus luteolus</i>	Threatened	Terrestrial	No
Reptile				
Sea turtle, green	<i>Chelonia mydas</i>	Endangered	Saltwater	No
Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
Sea turtle, Kemp's ridley	<i>Lepidochelys kempi</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No
Tortoise, Gopher	<i>Gopherus polyphemus</i>	Threatened	Terrestrial	No
Turtle, Ringed Sawback	<i>Graptemys oculifera</i>	Threatened	Freshwater, Terrestrial	No
Maine				
(7) species:				<u>CH</u>
Bird				
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Tern, Roseate	<i>Sterna dougallii dougallii</i>	Endangered	Terrestrial	No
Dicot				
Lousewort, Furbish	<i>Pedicularis furbishiae</i>	Endangered	Terrestrial	No
Mammal				
Lynx, Canada	<i>Lynx canadensis</i>	Threatened	Terrestrial	No
Monocot				
Orchid, Eastern Prairie Fringed	<i>Platanthera leucophaea</i>	Threatened	Terrestrial	No
Pogonia, Small Whorled	<i>Isotria medeoloides</i>	Threatened	Terrestrial	No
Reptile				
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Maryland				
(14) species:				<u>CH</u>
Bird				
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Dicot				
Dropwort, Canby's	<i>Oxypolis canbyi</i>	Endangered	Terrestrial, Freshwater	No
Gerardia, Sandplain	<i>Agalinis acuta</i>	Endangered	Terrestrial	No
Harperella	<i>Ptilimnium nodosum</i>	Endangered	Freshwater	No
Joint-vetch, Sensitive	<i>Aeschynomene virginica</i>	Threatened	Terrestrial, Brackish	No
Mammal				
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterraneous, Terrestrial	Yes
Squirrel, Delmarva Peninsula Fox	<i>Sciurus niger cinereus</i>	Endangered	Terrestrial	No
Monocot				

Bulrush, Northeastern (=Barbed Bristle)	<i>Scirpus ancistrochaetus</i>	Endangered	Terrestrial, Freshwater	No
Pink, Swamp	<i>Helonias bullata</i>	Threatened	Terrestrial, Freshwater	No
Reptile				
Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
Sea turtle, Kemp's ridley	<i>Lepidochelys kempii</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No
Turtle, Bog (Northern population)	<i>Clemmys muhlenbergii</i>	Threatened	Terrestrial, Freshwater	No

Massachusetts (12) species: CH

Bird

Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Tern, Roseate	<i>Sterna dougallii dougallii</i>	Endangered	Terrestrial	No

Dicot

Gerardia, Sandplain	<i>Agalinis acuta</i>	Endangered	Terrestrial	No
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Mammal

Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterraneous, Terrestrial	Yes
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Monocot

Bulrush, Northeastern (=Barbed Bristle)	<i>Scirpus ancistrochaetus</i>	Endangered	Terrestrial, Freshwater	No
Pogonia, Small Whorled	<i>Isotria medeoloides</i>	Threatened	Terrestrial	No

Reptile

Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
Sea turtle, Kemp's ridley	<i>Lepidochelys kempii</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No
Turtle, Bog (Northern population)	<i>Clemmys muhlenbergii</i>	Threatened	Terrestrial, Freshwater	No
Turtle, Plymouth Red-bellied	<i>Pseudemys rubriventris bangsi</i>	Endangered	Terrestrial, Freshwater	Yes

Michigan (13) species: CH

Bird

Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Warbler (=Wood), Kirtland's	<i>Dendroica kirtlandii</i>	Endangered	Terrestrial	No

Dicot

Daisy, Lakeside	<i>Hymenoxys herbacea</i>	Threatened	Freshwater	No
Goldenrod, Houghton's	<i>Solidago houghtonii</i>	Threatened	Terrestrial	No
Monkey-flower, Michigan	<i>Mimulus glabratus var. michiganensis</i>	Endangered	Terrestrial, Freshwater	No
Thistle, Pitcher's	<i>Cirsium pitcheri</i>	Threatened	Terrestrial	No

Ferns

Fern, American hart's-tongue	<i>Asplenium scolopendrium</i> var. <i>americanum</i>	Threatened	Terrestrial	No
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Mammal

Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes
Lynx, Canada	<i>Lynx canadensis</i>	Threatened	Terrestrial	No

Monocot

Iris, Dwarf Lake	<i>Iris lacustris</i>	Threatened	Terrestrial	No
Orchid, Eastern Prairie Fringed	<i>Platanthera leucophaea</i>	Threatened	Terrestrial	No
Pogonia, Small Whorled	<i>Isotria medeoloides</i>	Threatened	Terrestrial	No

Reptile

Snake, Northern Copperbelly Water	<i>Nerodia erythrogaster neglecta</i>	Threatened	Freshwater, Terrestrial	No
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Minnesota

(6) species:

CH

Bird

Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
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Dicot

Clover, Prairie Bush	<i>Lespedeza leptostachya</i>	Threatened	Terrestrial	No
Roseroot, Leedy's	<i>Sedum integrifolium</i> ssp. <i>leedyi</i>	Threatened	Terrestrial	No

Mammal

Lynx, Canada	<i>Lynx canadensis</i>	Threatened	Terrestrial	No
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Monocot

Lily, Minnesota Trout	<i>Erythronium propullans</i>	Endangered	Terrestrial	No
Orchid, Western Prairie Fringed	<i>Platanthera praeclara</i>	Threatened	Terrestrial	No

Mississippi

(20) species:

CH

Amphibian

Frog, Dusky Gopher (Mississippi DPS)	<i>Rana capito sevosa</i>	Endangered	Terrestrial, Freshwater	No
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Bird

Crane, Mississippi Sandhill	<i>Grus canadensis pulla</i>	Endangered	Terrestrial, Freshwater	Yes
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Tern, Interior (population) Least	<i>Sterna antillarum</i>	Endangered	Terrestrial	No
Woodpecker, Red-cockaded	<i>Picoides borealis</i>	Endangered	Terrestrial	No

Dicot

Pondberry	<i>Lindera melissifolia</i>	Endangered	Terrestrial	No
Potato-bean, Price's	<i>Apios priceana</i>	Threatened	Terrestrial	No

Ferns

Quillwort, Louisiana	<i>Isoetes louisianensis</i>	Endangered	Freshwater, Terrestrial	No
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Mammal

Bat, Gray	<i>Myotis grisescens</i>	Endangered	Subterraneous, Terrestrial	No
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterraneous, Terrestrial	Yes
Bear, Louisiana Black	<i>Ursus americanus luteolus</i>	Threatened	Terrestrial	No

Reptile

Sea turtle, green	<i>Chelonia mydas</i>	Endangered	Saltwater	No
Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
Sea turtle, Kemp's ridley	<i>Lepidochelys kempi</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No
Snake, Eastern Indigo	<i>Drymarchon corais couperi</i>	Threatened	Terrestrial	No
Tortoise, Gopher	<i>Gopherus polyphemus</i>	Threatened	Terrestrial	No
Turtle, Ringed Sawback	<i>Graptemys oculifera</i>	Threatened	Freshwater, Terrestrial	No
Turtle, Yellow-blotched Map	<i>Graptemys flavimaculata</i>	Threatened	Freshwater, Terrestrial	No

Missouri

(12) species:

CH

Bird

Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Tern, Interior (population) Least	<i>Sterna antillarum</i>	Endangered	Terrestrial	No

Dicot

Aster, Decurrent False	<i>Boltonia decurrens</i>	Threatened	Terrestrial, Freshwater	No
Bladderpod, Missouri	<i>Lesquerella filiformis</i>	Threatened	Terrestrial	No
Clover, Running Buffalo	<i>Trifolium stoloniferum</i>	Endangered	Terrestrial	No
Fruit, Earth (=geocarpon)	<i>Geocarpon minimum</i>	Threatened	Terrestrial	No
Milkweed, Mead's	<i>Asclepias meadii</i>	Threatened	Terrestrial	No
Pondberry	<i>Lindera melissifolia</i>	Endangered	Terrestrial	No
Sneezeweed, Virginia	<i>Helenium virginicum</i>	Threatened	Vernal pool	No

Mammal

Bat, Gray	<i>Myotis grisescens</i>	Endangered	Subterraneous, Terrestrial	No
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterraneous, Terrestrial	Yes

Monocot

Orchid, Western Prairie Fringed	<i>Platanthera praeclara</i>	Threatened	Terrestrial	No
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Montana

(7) species:

CH

Bird

Crane, Whooping	<i>Grus americana</i>	Endangered	Terrestrial, Freshwater	Yes
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Tern, Interior (population) Least	<i>Sterna antillarum</i>	Endangered	Terrestrial	No

Dicot				
Catchfly, Spalding's	<i>Silene spaldingii</i>	Threatened	Terrestrial	No
Howellia, Water	<i>Howellia aquatilis</i>	Threatened	Freshwater	No
Mammal				
Bear, Grizzly	<i>Ursus arctos horribilis</i>	Threatened	Terrestrial	No
Ferret, Black-footed	<i>Mustela nigripes</i>	Endangered	Terrestrial	No
Nebraska	(7) species:			CH
Bird				
Crane, Whooping	<i>Grus americana</i>	Endangered	Terrestrial, Freshwater	Yes
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Tern, Interior (population) Least	<i>Sterna antillarum</i>	Endangered	Terrestrial	No
Dicot				
Butterfly Plant, Colorado	<i>Gaura neomexicana</i> var. <i>coloradensis</i>	Threatened	Terrestrial	Yes
Penstemon, Blowout	<i>Penstemon haydenii</i>	Endangered	Terrestrial	No
Mammal				
Ferret, Black-footed	<i>Mustela nigripes</i>	Endangered	Terrestrial	No
Monocot				
Orchid, Western Prairie Fringed	<i>Platanthera praecleara</i>	Threatened	Terrestrial	No
Nevada	(12) species:			CH
Bird				
Flycatcher, Southwestern Willow	<i>Empidonax traillii extimus</i>	Endangered	Terrestrial	Yes
Rail, Yuma Clapper	<i>Rallus longirostris yumanensis</i>	Endangered	Terrestrial	No
Dicot				
Blazing Star, Ash Meadows	<i>Mentzelia leucophylla</i>	Threatened	Terrestrial	Yes
Buckwheat, Steamboat	<i>Eriogonum ovalifolium</i> var. <i>williamsiae</i>	Endangered	Terrestrial	No
Centaury, Spring-loving	<i>Centaureum namophilum</i>	Threatened	Terrestrial	Yes
Gumplant, Ash Meadows	<i>Grindelia fraxino-pratensis</i>	Threatened	Terrestrial	Yes
Ivesia, Ash Meadows	<i>Ivesia kingii</i> var. <i>eremica</i>	Threatened	Terrestrial	Yes
Milk-vetch, Ash Meadows	<i>Astragalus phoenix</i>	Threatened	Terrestrial	Yes
Niterwort, Amargosa	<i>Nitrophila mohavensis</i>	Endangered	Terrestrial	Yes
Sunray, Ash Meadows	<i>Enceliopsis nudicaulis</i> var. <i>corrugata</i>	Threatened	Terrestrial	Yes
Monocot				
Ladies'-tresses, Ute	<i>Spiranthes diluvialis</i>	Threatened	Terrestrial	No
Reptile				
Tortoise, Desert	<i>Gopherus agassizii</i>	Threatened	Terrestrial	Yes

New Hampshire

(4) species:

CH**Dicot**

Milk-vetch, Jesup's	<i>Astragalus robbinsii</i> var. <i>jesupi</i>	Endangered	Terrestrial	No
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Mammal

Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes
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Monocot

Pogonia, Small Whorled	<i>Isotria medeoloides</i>	Threatened	Terrestrial	No
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Reptile

Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
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New Jersey

(13) species:

CH**Bird**

Curlew, Eskimo	<i>Numenius borealis</i>	Endangered	Terrestrial	No
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Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
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Dicot

Chaffseed, American	<i>Schwalbea americana</i>	Endangered	Terrestrial	No
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Joint-vetch, Sensitive	<i>Aeschynomene virginica</i>	Threatened	Terrestrial, Brackish	No
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Mammal

Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes
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Monocot

Beaked-rush, Knieskern's	<i>Rhynchospora knieskernii</i>	Threatened	Terrestrial	No
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Pink, Swamp	<i>Helonias bullata</i>	Threatened	Terrestrial, Freshwater	No
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Pogonia, Small Whorled	<i>Isotria medeoloides</i>	Threatened	Terrestrial	No
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Reptile

Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
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Sea turtle, Kemp's ridley	<i>Lepidochelys kempii</i>	Endangered	Saltwater	No
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Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
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Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No
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Turtle, Bog (Northern population)	<i>Clemmys muhlenbergii</i>	Threatened	Terrestrial, Freshwater	No
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New Mexico

(25) species:

CH**Amphibian**

Frog, Chiricahua Leopard	<i>Rana chiricahuensis</i>	Threatened	Freshwater, Terrestrial	No
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Bird

Crane, Whooping	<i>Grus americana</i>	Endangered	Terrestrial, Freshwater	Yes
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Falcon, Northern Aplomado	<i>Falco femoralis septentrionalis</i>	Endangered	Terrestrial	No
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Flycatcher, Southwestern Willow	<i>Empidonax traillii eximius</i>	Endangered	Terrestrial	Yes
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Owl, Mexican Spotted	<i>Strix occidentalis lucida</i>	Threatened	Terrestrial	Yes
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Tern, Interior (population) Least	<i>Sterna antillarum</i>	Endangered	Terrestrial	No

Dicot

Cactus, Knowlton	<i>Pediocactus knowltonii</i>	Endangered	Terrestrial	No
Cactus, Kuenzler Hedgehog	<i>Echinocereus fendleri</i> var. <i>kuenzleri</i>	Endangered	Terrestrial	No
Cactus, Lee Pincushion	<i>Coryphantha sneedii</i> var. <i>leei</i>	Threatened	Terrestrial	No
Cactus, Mesa Verde	<i>Sclerocactus mesae-verdae</i>	Threatened	Terrestrial	No
Cactus, Sneed Pincushion	<i>Coryphantha sneedii</i> var. <i>sneedii</i>	Endangered	Terrestrial	No
Fleabane, Zuni	<i>Erigeron rhizomatus</i>	Threatened	Terrestrial	No
Ipomopsis, Holy Ghost	<i>Ipomopsis sancti-spiritus</i>	Endangered	Terrestrial	No
Milk-vetch, Mancos	<i>Astragalus humillimus</i>	Endangered	Terrestrial	No
Pennyroyal, Todsen's	<i>Hedeoma todsenii</i>	Endangered	Terrestrial	Yes
Poppy, Sacramento Prickly	<i>Argemone pleiacantha</i> ssp. <i>pinnatisecta</i>	Endangered	Terrestrial	No
Sunflower, Pecos	<i>Helianthus paradoxus</i>	Threatened	Terrestrial, Freshwater	No
Thistle, Sacramento Mountains	<i>Cirsium vinaceum</i>	Threatened	Terrestrial	No
Wild-buckwheat, Gypsum	<i>Eriogonum gypsophilum</i>	Threatened	Terrestrial	Yes

Mammal

Bat, Lesser (=Sanborn's) Long-nosed	<i>Leptonycteris curasoae yerbabuenae</i>	Endangered	Subterranean, Terrestrial	No
Bat, Mexican Long-nosed	<i>Leptonycteris nivalis</i>	Endangered	Subterranean, Terrestrial	No
Ferret, Black-footed	<i>Mustela nigripes</i>	Endangered	Terrestrial	No
Jaguar	<i>Panthera onca</i>	Endangered	Terrestrial	No

Reptile

Rattlesnake, New Mexican Ridge-nosed	<i>Crotalus willardi obscurus</i>	Threatened	Terrestrial	Yes
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New York

(15) species:

CH

Bird

Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Tern, Roseate	<i>Sterna dougallii dougallii</i>	Endangered	Terrestrial	No

Dicot

Amaranth, Seabeach	<i>Amaranthus pumilus</i>	Threatened	Coastal (neritic)	No
Gerardia, Sandplain	<i>Agalinis acuta</i>	Endangered	Terrestrial	No
Monkshood, Northern Wild	<i>Aconitum noveboracense</i>	Threatened	Terrestrial	No
Roseroot, Leedy's	<i>Sedum integrifolium</i> ssp. <i>leedyi</i>	Threatened	Terrestrial	No

Ferns

Fern, American hart's-tongue	<i>Asplenium scolopendrium</i> var. <i>americanum</i>	Threatened	Terrestrial	No
Mammal				
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes
Monocot				
Pogonia, Small Whorled	<i>Isotria medeoloides</i>	Threatened	Terrestrial	No
Reptile				
Sea turtle, green	<i>Chelonia mydas</i>	Endangered	Saltwater	No
Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
Sea turtle, Kemp's ridley	<i>Lepidochelys kempi</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No
Turtle, Bog (Northern population)	<i>Clemmys muhlenbergii</i>	Threatened	Terrestrial, Freshwater	No
North Carolina (40) species:				<u>CH</u>
Bird				
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Stork, Wood	<i>Mycteria americana</i>	Endangered	Terrestrial	No
Tern, Roseate	<i>Sterna dougallii dougallii</i>	Endangered	Terrestrial	No
Woodpecker, Red-cockaded	<i>Picoides borealis</i>	Endangered	Terrestrial	No
Dicot				
Amaranth, Seabeach	<i>Amaranthus pumilus</i>	Threatened	Coastal (neritic)	No
Avens, Spreading	<i>Geum radiatum</i>	Endangered	Terrestrial	No
Bittercress, Small-anthered	<i>Cardamine micranthera</i>	Endangered	Terrestrial	No
Blazing Star, Heller's	<i>Liatris helleri</i>	Threatened	Terrestrial	No
Bluet, Roan Mountain	<i>Hedyotis purpurea</i> var. <i>montana</i>	Endangered	Terrestrial	No
Chaffseed, American	<i>Schwalbea americana</i>	Endangered	Terrestrial	No
Coneflower, Smooth	<i>Echinacea laevigata</i>	Endangered	Terrestrial	No
Dropwort, Canby's	<i>Oxypolis canbyi</i>	Endangered	Terrestrial, Freshwater	No
Goldenrod, Blue Ridge	<i>Solidago spithamea</i>	Threatened	Terrestrial	No
Harperella	<i>Ptilimnium nodosum</i>	Endangered	Freshwater	No
Heartleaf, Dwarf-flowered	<i>Hexastylis naniflora</i>	Threatened	Terrestrial	No
Heather, Mountain Golden	<i>Hudsonia montana</i>	Threatened	Terrestrial	Yes
Joint-vetch, Sensitive	<i>Aeschynomene virginica</i>	Threatened	Terrestrial, Brackish	No
Loosestrife, Rough-leaved	<i>Lysimachia asperulaefolia</i>	Endangered	Terrestrial	No
Meadowrue, Cooley's	<i>Thalictrum cooleyi</i>	Endangered	Terrestrial	No
Pitcher-plant, Green	<i>Sarracenia oreophila</i>	Endangered	Terrestrial, Freshwater	No
Pitcher-plant, Mountain Sweet	<i>Sarracenia rubra</i> ssp. <i>jonesii</i>	Endangered	Freshwater, Terrestrial	No

Pondberry	<i>Lindera melissifolia</i>	Endangered	Terrestrial	No
Spiraea, Virginia	<i>Spiraea virginiana</i>	Threatened	Terrestrial	No
Sumac, Michaux's	<i>Rhus michauxii</i>	Endangered	Terrestrial	No
Sunflower, Schweinitz's	<i>Helianthus schweinitzii</i>	Endangered	Terrestrial	No

Lichen

Lichen, Rock Gnome	<i>Gymnoderma lineare</i>	Endangered	Terrestrial	No
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Mammal

Bat, Gray	<i>Myotis grisescens</i>	Endangered	Subterranean, Terrestrial	No
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes
Bat, Virginia Big-eared	<i>Corynorhinus (=Plecotus) townsendii virginianus</i>	Endangered	Terrestrial, Subterranean	Yes
Squirrel, Carolina Northern Flying	<i>Glaucomys sabrinus coloratus</i>	Endangered	Terrestrial	No

Monocot

Arrowhead, Bunched	<i>Sagittaria fasciculata</i>	Endangered	Freshwater	No
Irisette, White	<i>Sisyrinchium dichotomum</i>	Endangered	Terrestrial	No
Pink, Swamp	<i>Helonias bullata</i>	Threatened	Terrestrial, Freshwater	No
Pogonia, Small Whorled	<i>Isotria medeoloides</i>	Threatened	Terrestrial	No
Sedge, Golden	<i>Carex lutea</i>	Endangered	Terrestrial	No

Reptile

Sea turtle, green	<i>Chelonia mydas</i>	Endangered	Saltwater	No
Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
Sea turtle, Kemp's ridley	<i>Lepidochelys kempii</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No

North Dakota

(4) species:

CH

Bird

Crane, Whooping	<i>Grus americana</i>	Endangered	Terrestrial, Freshwater	Yes
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Tern, Interior (population) Least	<i>Sterna antillarum</i>	Endangered	Terrestrial	No

Monocot

Orchid, Western Prairie Fringed	<i>Platanthera praeclara</i>	Threatened	Terrestrial	No
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Ohio

(11) species:

CH

Bird

Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
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Dicot

Clover, Running Buffalo	<i>Trifolium stoloniferum</i>	Endangered	Terrestrial	No
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Daisy, Lakeside	<i>Hymenoxys herbacea</i>	Threatened	Freshwater	No
Monkshood, Northern Wild	<i>Aconitum noveboracense</i>	Threatened	Terrestrial	No
Spiraea, Virginia	<i>Spiraea virginiana</i>	Threatened	Terrestrial	No

Mammal

Bat, Gray	<i>Myotis grisescens</i>	Endangered	Subterranean, Terrestrial	No
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes

Monocot

Orchid, Eastern Prairie Fringed	<i>Platanthera leucophaea</i>	Threatened	Terrestrial	No
Pogonia, Small Whorled	<i>Isotria medeoloides</i>	Threatened	Terrestrial	No

Reptile

Snake, Lake Erie Water	<i>Nerodia sipedon insularum</i>	Threatened	Terrestrial, Freshwater	No
Snake, Northern Copperbelly Water	<i>Nerodia erythrogaster neglecta</i>	Threatened	Freshwater, Terrestrial	No

Oklahoma (11) species: CH

Bird

Crane, Whooping	<i>Grus americana</i>	Endangered	Terrestrial, Freshwater	Yes
Curllew, Eskimo	<i>Numenius borealis</i>	Endangered	Terrestrial	No
Plover, Piping	<i>Charadrius melodius</i>	Endangered	Terrestrial	Yes
Tern, Interior (population) Least	<i>Sterna antillarum</i>	Endangered	Terrestrial	No
Vireo, Black-capped	<i>Vireo atricapilla</i>	Endangered	Terrestrial	No
Woodpecker, Red-cockaded	<i>Picoides borealis</i>	Endangered	Terrestrial	No

Mammal

Bat, Gray	<i>Myotis grisescens</i>	Endangered	Subterranean, Terrestrial	No
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes
Bat, Ozark Big-eared	<i>Corynorhinus (=Plecotus) townsendii ingens</i>	Endangered	Terrestrial, Subterranean	No

Monocot

Orchid, Eastern Prairie Fringed	<i>Platanthera leucophaea</i>	Threatened	Terrestrial	No
Orchid, Western Prairie Fringed	<i>Platanthera praecleara</i>	Threatened	Terrestrial	No

Oregon (21) species: CH

Bird

Murrelet, Marbled	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	Freshwater, Terrestrial, Saltwater	Yes
Owl, Northern Spotted	<i>Strix occidentalis caurina</i>	Threatened	Terrestrial	Yes
Plover, Western Snowy	<i>Charadrius alexandrinus nivosus</i>	Threatened	Terrestrial	Yes

Dicot

Catchfly, Spalding's	<i>Silene spaldingii</i>	Threatened	Terrestrial	No
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Checker-mallow, Nelson's	<i>Sidalcea nelsoniana</i>	Threatened	Terrestrial	No
Daisy, Willamette	<i>Erigeron decumbens</i> var. <i>decumbens</i>	Endangered	Terrestrial	No
Four-o'clock, Macfarlane's	<i>Mirabilis macfarlanei</i>	Threatened	Terrestrial	No
Lomatium, Bradshaw's	<i>Lomatium bradshawii</i>	Endangered	Terrestrial, Freshwater	No
Lomatium, Cook's	<i>Lomatium cookii</i>	Endangered	Vernal pool	No
Lupine, Kincaid's	<i>Lupinus sulphureus</i> (=oreganus) ssp. <i>kincaidii</i> (=var. <i>kincaidii</i>)	Threatened	Terrestrial	No
Meadowfoam, Large-flowered Woolly	<i>Limnanthes floccosa</i> ssp.	Endangered	Vernal pool	No
Milk-vetch, Applegate's	<i>Astragalus applegatei</i>	Endangered	Terrestrial	No
Popcornflower, Rough	<i>Plagiobothrys hirtus</i>	Endangered	Vernal pool	No
Thelypody, Howell's Spectacular	<i>Thelypodium howellii spectabilis</i>	Threatened	Terrestrial	No
Wire-lettuce, Malheur	<i>Stephanomeria malheurensis</i>	Endangered	Terrestrial	Yes

Mammal

Deer, Columbian White-tailed	<i>Odocoileus virginianus leucurus</i>	Endangered	Terrestrial	No
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Monocot

Fritillary, Gentner's	<i>Fritillaria gentneri</i>	Endangered	Terrestrial	No
Lily, Western	<i>Lilium occidentale</i>	Endangered	Terrestrial	No

Reptile

Sea turtle, green	<i>Chelonia mydas</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No

Pennsylvania

(6) species:

CH

Bird

Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
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Mammal

Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes
Squirrel, Delmarva Peninsula Fox	<i>Sciurus niger cinereus</i>	Endangered	Terrestrial	No

Monocot

Bulrush, Northeastern (=Barbed Bristle)	<i>Scirpus ancistrochaetus</i>	Endangered	Terrestrial, Freshwater	No
Pogonia, Small Whorled	<i>Isotria medeoloides</i>	Threatened	Terrestrial	No

Reptile

Turtle, Bog (Northern population)	<i>Clemmys muhlenbergii</i>	Threatened	Terrestrial, Freshwater	No
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Puerto Rico

(69) species:

CH

Amphibian

Coqui, Golden	<i>Eleutherodactylus jasperi</i>	Threatened	Freshwater, Terrestrial	Yes
Guaion	<i>Eleutherodactylus cooki</i>	Threatened	Freshwater, Terrestrial	No

Toad, Puerto Rican Crested	<i>Peltophyryne lemur</i>	Threatened	Terrestrial, Freshwater	No
Bird				
Blackbird, Yellow-shouldered	<i>Agelaius xanthomus</i>	Endangered	Terrestrial	Yes
Hawk, Puerto Rican Broad-winged	<i>Buteo platypterus brunnescens</i>	Endangered	Terrestrial	No
Hawk, Puerto Rican Sharp-shinned	<i>Accipiter striatus venator</i>	Endangered	Terrestrial	No
Nightjar, Puerto Rico	<i>Caprimulgus noctitherus</i>	Endangered	Terrestrial	No
Parrot, Puerto Rican	<i>Amazona vittata</i>	Endangered	Terrestrial	No
Pigeon, Puerto Rican Plain	<i>Columba inornata wetmorei</i>	Endangered	Terrestrial	No
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Tern, Roseate	<i>Sterna dougallii dougallii</i>	Endangered	Terrestrial	No
Dicot				
Auerodendron pauciflorum (ncn)	<i>Auerodendron pauciflorum</i>	Endangered	Terrestrial	No
Bariaco	<i>Trichilia triacantha</i>	Endangered	Terrestrial	No
Boxwood, Vahl's	<i>Buxus vahlII</i>	Endangered	Terrestrial	No
Calyptanthus Thomasiana (ncn)	<i>Calyptanthus thomasiana</i>	Endangered	Terrestrial	No
Capa Rosa	<i>Callicarpa ampla</i>	Endangered	Terrestrial	No
Catesbaea Melanocarpa (ncn)	<i>Catesbaea melanocarpa</i>	Endangered	Terrestrial	No
Chamaecrista glandulosa (ncn)	<i>Chamaecrista glandulosa</i> var. <i>mirabilis</i>	Endangered	Terrestrial	No
Chumbo, Higo	<i>Harrisia portoricensis</i>	Threatened	Terrestrial	No
Chupacallos	<i>Pleodendron macranthum</i>	Endangered	Terrestrial	No
Cobana Negra	<i>Stahia monosperma</i>	Threatened	Terrestrial	No
Cordia bellonis (ncn)	<i>Cordia bellonis</i>	Endangered	Terrestrial	No
Daphnopsis hellerana (ncn)	<i>Daphnopsis hellerana</i>	Endangered	Terrestrial	No
Erubia	<i>Solanum drymophilum</i>	Endangered	Terrestrial	No
Eugenia Woodburyana	<i>Eugenia woodburyana</i>	Endangered	Terrestrial	No
Gesneria pauciflora (ncn)	<i>Gesneria pauciflora</i>	Threatened	Terrestrial	No
Goetzea, Beautiful (Matabuey)	<i>Goetzea elegans</i>	Endangered	Terrestrial	No
Higuero De Sierra	<i>Crescentia portoricensis</i>	Endangered	Terrestrial	No
Holly, Cook's	<i>Ilex cookii</i>	Endangered	Terrestrial	No
Ilex sintenisii (ncn)	<i>Ilex sintenisii</i>	Endangered	Terrestrial	No
Leptocereus grantianus (ncn)	<i>Leptocereus grantianus</i>	Endangered	Terrestrial	No
Lyonia truncata var. proctorii (ncn)	<i>Lyonia truncata</i> var. <i>proctorii</i>	Endangered	Terrestrial	No
Mitracarpus Maxwelliae	<i>Mitracarpus maxwelliae</i>	Endangered	Terrestrial	No
Mitracarpus Polycladus	<i>Mitracarpus polycladus</i>	Endangered	Terrestrial	No
Myrcia Paganii	<i>Myrcia paganii</i>	Endangered	Terrestrial	No
Palo Colorado (Temstroemia luquillensis)	<i>Temstroemia luquillensis</i>	Endangered	Terrestrial	No

Palo de Jazmín	<i>Styrax portoricensis</i>	Endangered	Terrestrial	No
Palo de Nigua	<i>Cornutia obovata</i>	Endangered	Terrestrial	No
Palo de Ramon	<i>Banara vanderbiltii</i>	Endangered	Terrestrial	No
Palo de Rosa	<i>Ottoschulzia rhodoxylon</i>	Endangered	Terrestrial	No
Peperomia, Wheeler's	<i>Peperomia wheeleri</i>	Endangered	Terrestrial	No
Prickly-ash, St. Thomas	<i>Zanthoxylum thomasianum</i>	Endangered	Terrestrial	No
Schoepfia arenaria (ncn)	<i>Schoepfia arenaria</i>	Threatened	Terrestrial	No
Ternstroemia subsessilis (ncn)	<i>Ternstroemia subsessilis</i>	Endangered	Terrestrial	No
Uvillo	<i>Eugenia haematocarpa</i>	Endangered	Terrestrial	No
Vernonia Proctorii (ncn)	<i>Vernonia proctorii</i>	Endangered	Terrestrial	No
Walnut, Nogal	<i>Juglans jamaicensis</i>	Endangered	Terrestrial	No

Ferns

Fern, Adiantum vivesii	<i>Adiantum vivesii</i>	Endangered	Terrestrial	No
Fern, Elaphoglossum serpens	<i>Elaphoglossum serpens</i>	Endangered	Terrestrial	No
Fern, Thelypteris inabonensis	<i>Thelypteris inabonensis</i>	Endangered	Terrestrial	No
Fern, Thelypteris verecunda	<i>Thelypteris verecunda</i>	Endangered	Terrestrial	No
Fern, Thelypteris yaucoensis	<i>Thelypteris yaucoensis</i>	Endangered	Terrestrial	No
Polystichum calderonense (ncn)	<i>Polystichum calderonense</i>	Endangered	Terrestrial	No
Tectaria Estremerana	<i>Tectaria estremerana</i>	Endangered	Terrestrial	No
Tree Fern, Elfin	<i>Cyathea dryopteroides</i>	Endangered	Terrestrial	No

Monocot

Aristida chaseae (ncn)	<i>Aristida chaseae</i>	Endangered	Terrestrial	No
Cranichis Ricartii	<i>Cranichis ricartii</i>	Endangered	Terrestrial	No
Lepanthes eltorensis (ncn)	<i>Lepanthes eltorensis</i>	Endangered	Terrestrial	No
Manaca, palma de	<i>Calyptrotroma rivalis</i>	Threatened	Terrestrial	No
Pelos del Diablo	<i>Aristida portoricensis</i>	Endangered	Terrestrial	No

Reptile

Anole, Culebra Island Giant	<i>Anolis roosevelti</i>	Endangered	Terrestrial	Yes
Boa, Mona	<i>Epicrates monensis monensis</i>	Threatened	Terrestrial	Yes
Boa, Puerto Rican	<i>Epicrates inornatus</i>	Endangered	Terrestrial	No
Gecko, Monito	<i>Sphaerodactylus micropithecus</i>	Endangered	Terrestrial	Yes
Iguana, Mona Ground	<i>Cyclura stejnegeri</i>	Threatened	Terrestrial	Yes
Sea turtle, green	<i>Chelonia mydas</i>	Endangered	Saltwater	No
Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No

Rhode Island

(8) species:

CH

Bird				
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Dicot				
Gerardia, Sandplain	<i>Agalinis acuta</i>	Endangered	Terrestrial	No
Mammal				
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterraneous, Terrestrial	Yes
Monocot				
Pogonia, Small Whorled	<i>Isotria medeoloides</i>	Threatened	Terrestrial	No
Reptile				
Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
Sea turtle, Kemp's ridley	<i>Lepidochelys kempi</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No
South Carolina	(32) species:			<u>CH</u>
Amphibian				
Salamander, Flatwoods	<i>Ambystoma cingulatum</i>	Threatened	Freshwater, Vernal pool, Terrestrial	No
Bird				
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Stork, Wood	<i>Mycteria americana</i>	Endangered	Terrestrial	No
Warbler, Bachman's	<i>Vermivora bachmanii</i>	Endangered	Terrestrial	No
Woodpecker, Red-cockaded	<i>Picoides borealis</i>	Endangered	Terrestrial	No
Dicot				
Amaranth, Seabeach	<i>Amaranthus pumilus</i>	Threatened	Coastal (neritic)	No
Amphianthus, Little	<i>Amphianthus pusillus</i>	Threatened	Freshwater	No
Chaffseed, American	<i>Schwalbea americana</i>	Endangered	Terrestrial	No
Coneflower, Smooth	<i>Echinacea laevigata</i>	Endangered	Terrestrial	No
Dropwort, Canby's	<i>Oxypolis canbyi</i>	Endangered	Terrestrial, Freshwater	No
Gooseberry, Miccosukee	<i>Ribes echinellum</i>	Threatened	Terrestrial	No
Harperella	<i>Ptilimnium nodosum</i>	Endangered	Freshwater	No
Heartleaf, Dwarf-flowered	<i>Hexastylis naniflora</i>	Threatened	Terrestrial	No
Loosestrife, Rough-leaved	<i>Lysimachia asperulaefolia</i>	Endangered	Terrestrial	No
Pitcher-plant, Mountain Sweet	<i>Sarracenia rubra ssp. jonesii</i>	Endangered	Freshwater, Terrestrial	No
Pondberry	<i>Lindera melissifolia</i>	Endangered	Terrestrial	No
Sunflower, Schweinitz's	<i>Heliopsis scweinitzii</i>	Endangered	Terrestrial	No
Ferns				
Quillwort, Black-spored	<i>Isoetes melanospora</i>	Endangered	Vernal pool	No

Lichen				
Lichen, Rock Gnome	<i>Gymnoderma lineare</i>	Endangered	Terrestrial	No
Mammal				
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterraneous, Terrestrial	Yes
Monocot				
Arrowhead, Bunched	<i>Sagittaria fasciculata</i>	Endangered	Freshwater	No
Irisette, White	<i>Sisyrinchium dichotomum</i>	Endangered	Terrestrial	No
Pink, Swamp	<i>Helonias bullata</i>	Threatened	Terrestrial, Freshwater	No
Pogonia, Small Whorled	<i>Isotria medeoloides</i>	Threatened	Terrestrial	No
Trillium, Persistent	<i>Trillium persistens</i>	Endangered	Terrestrial	No
Trillium, Relict	<i>Trillium reliquum</i>	Endangered	Terrestrial	No
Reptile				
Sea turtle, green	<i>Chelonia mydas</i>	Endangered	Saltwater	No
Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
Sea turtle, Kemp's ridley	<i>Lepidochelys kempii</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No
Snake, Eastern Indigo	<i>Drymarchon corais couperi</i>	Threatened	Terrestrial	No
South Dakota	(5) species:			<u>CH</u>
Bird				
Crane, Whooping	<i>Grus americana</i>	Endangered	Terrestrial, Freshwater	Yes
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Tern, Interior (population) Least	<i>Sterna antillarum</i>	Endangered	Terrestrial	No
Mammal				
Ferret, Black-footed	<i>Mustela nigripes</i>	Endangered	Terrestrial	No
Monocot				
Orchid, Western Prairie Fringed	<i>Platanthera praeclara</i>	Threatened	Terrestrial	No
Tennessee	(27) species:			<u>CH</u>
Bird				
Stork, Wood	<i>Mycteria americana</i>	Endangered	Terrestrial	No
Tern, Interior (population) Least	<i>Sterna antillarum</i>	Endangered	Terrestrial	No
Woodpecker, Red-cockaded	<i>Picoides borealis</i>	Endangered	Terrestrial	No
Dicot				
Aster, Ruth's Golden	<i>Pityopsis ruthii</i>	Endangered	Terrestrial	No
Avens, Spreading	<i>Geum radiatum</i>	Endangered	Terrestrial	No
Bladderpod, Spring Creek	<i>Lesquerella perforata</i>	Endangered	Floodplain	No

Bluet, Roan Mountain	<i>Hedyotis purpurea</i> var. <i>montana</i>	Endangered	Terrestrial	No
Chaffseed, American	<i>Schwalbea americana</i>	Endangered	Terrestrial	No
Clover, Leafy Prairie	<i>Dalea tolosa</i>	Endangered	Terrestrial	No
Coneflower, Tennessee Purple	<i>Echinacea tennesseensis</i>	Endangered	Terrestrial	No
Goldenrod, Blue Ridge	<i>Solidago spithamea</i>	Threatened	Terrestrial	No
Ground-plum, Guthrie's	<i>Astragalus bibullatus</i>	Endangered	Terrestrial	No
Pitcher-plant, Green	<i>Sarracenia oreophila</i>	Endangered	Terrestrial, Freshwater	No
Potato-bean, Price's	<i>Apios priceana</i>	Threatened	Terrestrial	No
Rock-cress, Large (=Braun's)	<i>Arabis perstellata</i> E. L. Braun var. <i>ampla</i> Rollins	Endangered	Terrestrial	Yes
Rock-cress, Small	<i>Arabis perstellata</i> E. L. Braun var. <i>perstellata</i> Fernald	Endangered	Terrestrial	Yes
Rosemary, Cumberland	<i>Conradina verticillata</i>	Threatened	Terrestrial	No
Sandwort, Cumberland	<i>Arenaria cumberlandensis</i>	Endangered	Terrestrial	No
Skullcap, Large-flowered	<i>Scutellaria montana</i>	Threatened	Terrestrial	No
Spiraea, Virginia	<i>Spiraea virginiana</i>	Threatened	Terrestrial	No

Ferns

Fern, American hart's-tongue	<i>Asplenium scolopendrium</i> var. <i>americanum</i>	Threatened	Terrestrial	No
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Lichen

Lichen, Rock Gnome	<i>Gymnoderma lineare</i>	Endangered	Terrestrial	No
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Mammal

Bat, Gray	<i>Myotis grisescens</i>	Endangered	Subterraneous, Terrestrial	No
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterraneous, Terrestrial	Yes
Squirrel, Carolina Northern Flying	<i>Glaucomys sabrinus coloratus</i>	Endangered	Terrestrial	No

Monocot

Grass, Tennessee Yellow-eyed	<i>Xyris tennesseensis</i>	Endangered	Terrestrial	No
Pogonia, Small Whorled	<i>Isotria medeoloides</i>	Threatened	Terrestrial	No

Texas

(56) species:

CH

Amphibian

Salamander, Barton Springs	<i>Eurycea sosorum</i>	Endangered	Freshwater, Terrestrial	No
Salamander, San Marcos	<i>Eurycea nana</i>	Threatened	Freshwater, Terrestrial	Yes
Salamander, Texas Blind	<i>Typhlomolge rathbuni</i>	Endangered	Subterraneous, Freshwater	No
Toad, Houston	<i>Bufo houstonensis</i>	Endangered	Terrestrial, Freshwater	Yes

Bird

Crane, Whooping	<i>Grus americana</i>	Endangered	Terrestrial, Freshwater	Yes
Curlew, Eskimo	<i>Numenius borealis</i>	Endangered	Terrestrial	No

Falcon, Northern Aplomado	<i>Falco femoralis septentrionalis</i>	Endangered	Terrestrial	No
Flycatcher, Southwestern Willow	<i>Empidonax traillii extimus</i>	Endangered	Terrestrial	Yes
Owl, Mexican Spotted	<i>Strix occidentalis lucida</i>	Threatened	Terrestrial	Yes
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Prairie-chicken, Attwater's Greater	<i>Tympanuchus cupido attwateri</i>	Endangered	Terrestrial	No
Tern, Interior (population) Least	<i>Sterna antillarum</i>	Endangered	Terrestrial	No
Vireo, Black-capped	<i>Vireo atricapilla</i>	Endangered	Terrestrial	No
Warbler (=Wood), Golden-cheeked	<i>Dendroica chrysoparia</i>	Endangered	Terrestrial	No
Woodpecker, Red-cockaded	<i>Picoides borealis</i>	Endangered	Terrestrial	No

Dicot

Ambrosia, South Texas	<i>Ambrosia cheiranthifolia</i>	Endangered	Terrestrial	No
Ayenia, Texas	<i>Ayenia limitaris</i>	Endangered	Terrestrial	No
Bladderpod, White	<i>Lesquerella pallida</i>	Endangered	Terrestrial	No
Bladderpod, Zapata	<i>Lesquerella thamnophila</i>	Endangered	Terrestrial	Yes
Cactus, Black Lace	<i>Echinocereus reichenbachii</i> var. <i>albertii</i>	Endangered	Terrestrial	No
Cactus, Bunched Cory	<i>Coryphantha ramillosa</i>	Threatened	Terrestrial	No
Cactus, Chisos Mountain Hedgehog	<i>Echinocereus chisoensis</i> var. <i>chisoensis</i>	Threatened	Terrestrial	No
Cactus, Lloyd's Mariposa	<i>Echinomastus mariposensis</i>	Threatened	Terrestrial	No
Cactus, Nellie Cory	<i>Coryphantha minima</i>	Endangered	Terrestrial	No
Cactus, Sneed Pincushion	<i>Coryphantha sneedii</i> var. <i>sneedii</i>	Endangered	Terrestrial	No
Cactus, Star	<i>Astrophytum asterias</i>	Endangered	Terrestrial	No
Cactus, Tobusch Fishhook	<i>Ancistrocactus tobuschii</i>	Endangered	Terrestrial	No
Cat's-eye, Terlingua Creek	<i>Cryptantha crassipes</i>	Endangered	Terrestrial	No
Dawn-flower, Texas Prairie (=Texas Bitterweed)	<i>Hymenoxys texana</i>	Endangered	Terrestrial	No
Dogweed, Ashy	<i>Thymophylla tephroleuca</i>	Endangered	Terrestrial	No
Frankenia, Johnston's	<i>Frankenia johnstonii</i>	Endangered	Terrestrial	No
Fruit, Earth (=geocarpon)	<i>Geocarpon minimum</i>	Threatened	Terrestrial	No
Manioc, Walker's	<i>Manihot walkerae</i>	Endangered	Terrestrial	No
Oak, Hinckley	<i>Quercus hinckleyi</i>	Threatened	Terrestrial	No
Phlox, Texas Trailing	<i>Phlox nivalis</i> ssp. <i>texensis</i>	Endangered	Terrestrial	No
Pitaya, Davis' Green	<i>Echinocereus viridiflorus</i> var. <i>davisii</i>	Endangered	Terrestrial	No
Poppy-mallow, Texas	<i>Callirhoe scabriuscula</i>	Endangered	Terrestrial	No
Rush-pea, Slender	<i>Hoffmannseggia tenella</i>	Endangered	Terrestrial	No
Sand-verbena, Large-fruited	<i>Abronia macrocarpa</i>	Endangered	Terrestrial	No
Snowbells, Texas	<i>Styrax texanus</i>	Endangered	Terrestrial	No

Sunflower, Pecos	<i>Helianthus paradoxus</i>	Threatened	Terrestrial, Freshwater	No
Wild-buckwheat, Gypsum	<i>Eriogonum gypsophilum</i>	Threatened	Terrestrial	Yes
Mammal				
Bat, Mexican Long-nosed	<i>Leptonycteris nivalis</i>	Endangered	Subterranean, Terrestrial	No
Bear, Louisiana Black	<i>Ursus americanus luteolus</i>	Threatened	Terrestrial	No
Jaguarundi, Gulf Coast	<i>Herpailurus (=Felis) yagouaroundi cacomitli</i>	Endangered	Terrestrial	No
Jaguarundi, Sinaloa	<i>Herpailurus (=Felis) yagouaroundi tolteca</i>	Endangered	Terrestrial	No
Ocelot	<i>Leopardus (=Felis) pardalis</i>	Endangered	Terrestrial	No
Monocot				
Ladies'-tresses, Navasota	<i>Spiranthes parksii</i>	Endangered	Terrestrial	No
Pondweed, Little Aguja Creek	<i>Potamogeton clystocarpus</i>	Endangered	Freshwater	No
Wild-rice, Texas	<i>Zizania texana</i>	Endangered	Freshwater	Yes
Reptile				
Sea turtle, green	<i>Chelonia mydas</i>	Endangered	Saltwater	No
Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
Sea turtle, Kemp's ridley	<i>Lepidochelys kempi</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No
Snake, Concho Water	<i>Nerodia paucimaculata</i>	Threatened	Freshwater, Terrestrial	Yes
Utah	(29) species:			<u>CH</u>
Bird				
Flycatcher, Southwestern Willow	<i>Empidonax traillii eximius</i>	Endangered	Terrestrial	Yes
Owl, Mexican Spotted	<i>Strix occidentalis lucida</i>	Threatened	Terrestrial	Yes
Dicot				
Bear-poppy, Dwarf	<i>Arctomecon humilis</i>	Endangered	Terrestrial	No
Bladderpod, Kodachrome	<i>Lesquerella tumulosa</i>	Endangered	Terrestrial	No
Buttercup, Autumn	<i>Ranunculus aestivalis (=acrifloris)</i>	Endangered	Terrestrial	No
Cactus, San Rafael	<i>Pediocactus despainii</i>	Endangered	Terrestrial	No
Cactus, Siler Pincushion	<i>Pediocactus (=Echinocactus,=Utahia) sileri</i>	Threatened	Terrestrial	No
Cactus, Uinta Basin Hookless	<i>Sclerocactus glaucus</i>	Threatened	Terrestrial	No
Cactus, Winkler	<i>Pediocactus winkleri</i>	Threatened	Terrestrial	No
Cactus, Wright Fishhook	<i>Sclerocactus wrightiae</i>	Endangered	Terrestrial	No
Cycladenia, Jones	<i>Cycladenia jonesii (=humilis)</i>	Threatened	Terrestrial	No
Daisy, Maguire	<i>Erigeron maguirei</i>	Threatened	Freshwater	No
Milk-vetch, Deseret	<i>Astragalus desereticus</i>	Threatened	Terrestrial	No

Milk-vetch, Heliotrope	<i>Astragalus montii</i>	Threatened	Terrestrial	Yes
Milk-vetch, Holmgren	<i>Astragalus holmgreniorum</i>	Endangered	Terrestrial	No
Milk-vetch, Shiwits	<i>Astragalus ampullarioides</i>	Endangered	Terrestrial	No
Milkweed, Welsh's	<i>Asclepias welshii</i>	Threatened	Terrestrial	Yes
Phacelia, Clay	<i>Phacelia argillacea</i>	Endangered	Terrestrial	No
Primrose, Maguire	<i>Primula maguirei</i>	Threatened	Terrestrial	No
Reed-mustard, Barneby	<i>Schoenocrambe barnebyi</i>	Endangered	Terrestrial	No
Reed-mustard, Clay	<i>Schoenocrambe argillacea</i>	Threatened	Terrestrial	No
Reed-mustard, Shrubby	<i>Schoenocrambe suffrutescens</i>	Endangered	Terrestrial	No
Ridge-crest (=Pepper-crest),	<i>Lepidium barnebyanum</i>	Endangered	Terrestrial	No
Townsendia, Last Chance	<i>Townsendia aprica</i>	Threatened	Terrestrial	No

Mammal

Ferret, Black-footed	<i>Mustela nigripes</i>	Endangered	Terrestrial	No
Prairie Dog, Utah	<i>Cynomys parvidens</i>	Threatened	Terrestrial, Subterranean	No

Monocot

Ladies'-tresses, Ute	<i>Spiranthes diluvialis</i>	Threatened	Terrestrial	No
Sedge, Navajo	<i>Carex specuicola</i>	Threatened	Terrestrial	Yes

Reptile

Tortoise, Desert	<i>Gopherus agassizii</i>	Threatened	Terrestrial	Yes
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Vermont

(3) species:

CH

Dicot

Milk-vetch, Jesup's	<i>Astragalus robbinsii</i> var. <i>jesupi</i>	Endangered	Terrestrial	No
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Mammal

Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes
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Monocot

Bulrush, Northeastern (=Barbed Bristle)	<i>Scirpus ancistrochaetus</i>	Endangered	Terrestrial, Freshwater	No
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Virginia

(29) species:

CH

Amphibian

Salamander, Shenandoah	<i>Plethodon shenandoah</i>	Endangered	Freshwater, Terrestrial	No
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Bird

Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Woodpecker, Red-cockaded	<i>Picoides borealis</i>	Endangered	Terrestrial	No

Dicot

Amaranth, Seabeach	<i>Amaranthus pumilus</i>	Threatened	Coastal (neritic)	No
Birch, Virginia Round-leaf	<i>Betula uber</i>	Threatened	Floodplain	No

Bittercress, Small-anthered	<i>Cardamine micranthera</i>	Endangered	Terrestrial	No
Chaffseed, American	<i>Schwalbea americana</i>	Endangered	Terrestrial	No
Coneflower, Smooth	<i>Echinacea laevigata</i>	Endangered	Terrestrial	No
Harperella	<i>Ptilimnium nodosum</i>	Endangered	Freshwater	No
Joint-vetch, Sensitive	<i>Aeschynomene virginica</i>	Threatened	Terrestrial, Brackish	No
Mallow, Peter's Mountain	<i>Iliamna corei</i>	Endangered	Terrestrial	No
Rock-cress, Shale Barren	<i>Arabis serotina</i>	Endangered	Terrestrial	No
Sneezeweed, Virginia	<i>Helenium virginicum</i>	Threatened	Vernal pool	No
Spiraea, Virginia	<i>Spiraea virginiana</i>	Threatened	Terrestrial	No
Sumac, Michaux's	<i>Rhus michauxii</i>	Endangered	Terrestrial	No
Sunflower, Schweinitz's	<i>Helianthus schweinitzii</i>	Endangered	Terrestrial	No

Mammal

Bat, Gray	<i>Myotis grisescens</i>	Endangered	Subterranean, Terrestrial	No
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes
Bat, Virginia Big-eared	<i>Corynorhinus (=Plecotus) townsendii virginianus</i>	Endangered	Terrestrial, Subterranean	Yes
Squirrel, Delmarva Peninsula Fox	<i>Sciurus niger cinereus</i>	Endangered	Terrestrial	No

Monocot

Bulrush, Northeastern (=Barbed Bristle)	<i>Scirpus ancistrochaetus</i>	Endangered	Terrestrial, Freshwater	No
Orchid, Eastern Prairie Fringed	<i>Platanthera leucophaea</i>	Threatened	Terrestrial	No
Pink, Swamp	<i>Helonias bullata</i>	Threatened	Terrestrial, Freshwater	No
Pogonia, Small Whorled	<i>Isotria medeoloides</i>	Threatened	Terrestrial	No

Reptile

Sea turtle, green	<i>Chelonia mydas</i>	Endangered	Saltwater	No
Sea turtle, hawksbill	<i>Eretmochelys imbricata</i>	Endangered	Saltwater	Yes
Sea turtle, Kemp's ridley	<i>Lepidochelys kempii</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes
Sea turtle, loggerhead	<i>Caretta caretta</i>	Threatened	Saltwater	No

Washington

(16) species:

CH

Bird

Murrelet, Marbled	<i>Brachyramphus marmoratus marmoratus</i>	Threatened	Freshwater, Terrestrial, Saltwater	Yes
Owl, Northern Spotted	<i>Strix occidentalis caurina</i>	Threatened	Terrestrial	Yes
Plover, Western Snowy	<i>Charadrius alexandrinus nivosus</i>	Threatened	Terrestrial	Yes

Dicot

Catchfly, Spalding's	<i>Silene spaldingii</i>	Threatened	Terrestrial	No
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Checker-mallow, Nelson's	<i>Sidalcea nelsoniana</i>	Threatened	Terrestrial	No
Checker-mallow, Wenatchee Mountains	<i>Sidalcea oregana</i> var. <i>calva</i>	Endangered	Terrestrial	Yes
Howellia, Water	<i>Howellia aquatilis</i>	Threatened	Freshwater	No
Lupine, Kincaid's	<i>Lupinus sulphureus</i> (=oreganus) <i>ssp. kincaidii</i> (=var. <i>kincaidii</i>)	Threatened	Terrestrial	No
Paintbrush, Golden	<i>Castilleja levisecta</i>	Threatened	Terrestrial	No
Stickseed, Showy	<i>Hackelia venusta</i>	Endangered	Terrestrial	No

Mammal

Bear, Grizzly	<i>Ursus arctos horribilis</i>	Threatened	Terrestrial	No
Caribou, Woodland	<i>Rangifer tarandus caribou</i>	Endangered	Terrestrial	No
Deer, Columbian White-tailed	<i>Odocoileus virginianus leucurus</i>	Endangered	Terrestrial	No
Rabbit, Pygmy	<i>Brachylagus idahoensis</i>	Endangered	Terrestrial	No

Reptile

Sea turtle, green	<i>Chelonia mydas</i>	Endangered	Saltwater	No
Sea turtle, leatherback	<i>Dermochelys coriacea</i>	Endangered	Saltwater	Yes

West Virginia

(10) species:

CH

Amphibian

Salamander, Cheat Mountain	<i>Plethodon nettingi</i>	Threatened	Freshwater, Terrestrial	No
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Dicot

Clover, Running Buffalo	<i>Trifolium stoloniferum</i>	Endangered	Terrestrial	No
Harperella	<i>Ptilimnium nodosum</i>	Endangered	Freshwater	No
Rock-cress, Shale Barren	<i>Arabis serotina</i>	Endangered	Terrestrial	No
Spiraea, Virginia	<i>Spiraea virginiana</i>	Threatened	Terrestrial	No

Mammal

Bat, Gray	<i>Myotis grisescens</i>	Endangered	Subterranean, Terrestrial	No
Bat, Indiana	<i>Myotis sodalis</i>	Endangered	Subterranean, Terrestrial	Yes
Bat, Virginia Big-eared	<i>Corynorhinus</i> (=Plecotus) <i>townsendii virginianus</i>	Endangered	Terrestrial, Subterranean	Yes
Squirrel, Carolina Northern Flying	<i>Glaucomys sabrinus coloratus</i>	Endangered	Terrestrial	No

Monocot

Bulrush, Northeastern (=Barbed Bristle)	<i>Scirpus ancistrochaetus</i>	Endangered	Terrestrial, Freshwater	No
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Wisconsin

(10) species:

CH

Bird

Crane, Whooping	<i>Grus americana</i>	Endangered	Terrestrial, Freshwater	Yes
Plover, Piping	<i>Charadrius melodus</i>	Endangered	Terrestrial	Yes
Warbler (=Wood), Kirtland's	<i>Dendroica kirtlandii</i>	Endangered	Terrestrial	No

Dicot

Clover, Prairie Bush	<i>Lespedeza leptostachya</i>	Threatened	Terrestrial	No
Locoweed, Fassett's	<i>Oxytropis campestris</i> var.	Threatened	Terrestrial	No
Monkshood, Northern Wild	<i>Aconitum noveboracense</i>	Threatened	Terrestrial	No
Thistle, Pitcher's	<i>Cirsium pitcheri</i>	Threatened	Terrestrial	No

Mammal

Lynx, Canada	<i>Lynx canadensis</i>	Threatened	Terrestrial	No
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Monocot

Iris, Dwarf Lake	<i>Iris lacustris</i>	Threatened	Terrestrial	No
Orchid, Eastern Prairie Fringed	<i>Platanthera leucophaea</i>	Threatened	Terrestrial	No

Wyoming

(6) species:

CH

Amphibian

Toad, Wyoming	<i>Bufo baxteri</i> (=hemiophrys)	Endangered	Freshwater, Terrestrial	No
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Dicot

Butterfly Plant, Colorado	<i>Gaura neomexicana</i> var. <i>coloradensis</i>	Threatened	Terrestrial	Yes
Yellowhead, Desert	<i>Yermo xanthocephalus</i>	Threatened	Terrestrial	Yes

Mammal

Bear, Grizzly	<i>Ursus arctos horribilis</i>	Threatened	Terrestrial	No
Ferret, Black-footed	<i>Mustela nigripes</i>	Endangered	Terrestrial	No
Mouse, Preble's Meadow Jumping	<i>Zapus hudsonius preblei</i>	Threatened	Terrestrial	Yes

No species were selected for exclusion.

Dispersed species included in report.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
PREVENTION, PESTICIDES AND
TOXIC SUBSTANCES

November 13, 2008

Ms. Amy Dugger-Ronyak
Regulatory Affairs Specialist
SEPRO CORPORATION
11550 North Meridian Street Suite 600
Carmel, IN 46032-4565

Subject: CSF Notification

Dear Ms. Dugger-Ronyak:

The Agency is in receipt of your Application for Pesticide Notification under Pesticide Registration Notice (PRN) 98-10 dated 2/27/07 for **EPA Registration 67690-16**. The Registration Division (RD) has conducted a review of the Confidential Statement of Formula (CSF) submitted with this request for applicability under PRN 98-10 and finds that the change(s) requested falls within the scope of PRN 98-10. Therefore, Alternate #1 CSF dated 7/22/08 is **acceptable**. A copy of the CSF has been added to the registration file for the subject product.

If you have any questions, please contact me via telephone at 703-308-8893 or e-mail (hobgood.sherada@epa.gov).

Sincerely,

A handwritten signature, likely of Sherada D. Hobgood, is written in ink. It consists of a stylized 'S' followed by a vertical line and a diagonal stroke.

Sherada D. Hobgood
Notifications Review Coordinator
Registration Division (7505P)
Office of Pesticide Programs



SePRO Corporation • 11550 North Meridian Street • Suite 600 • Carmel, Indiana 46032-4565
Phone: (317) 580-8282 • Fax: (317) 428-4577

July 22, 2008

Minor Formulation Review Coordinator (MFRC)
Document Processing Desk (NOTIF)
Office of Pesticide Programs (7504P)
U.S. Environmental Protection Agency
Room S-4900, One Potomac Yard
2777 South Crystal Drive.
Arlington, VA 22202-4501

**RE: Accelerated Review of a Minor Formulation Change, Pursuant to PR Notice 98-10
Cutless Technical (Alt. Brand Name: Flurprimidol Technical), EPA Reg. No. 67690-16**

Dear Ms. Hobgood:

On behalf of SePRO Corporation I am submitting an alternate Confidential Statement of Formula (CSF), Alternate #1, for Cutless Technical (EPA Reg. No. 67690-16). This new CSF qualifies as an accelerated review of a minor formulation amendment pursuant to PR Notice 98-10. Please find enclosed the following information to support this amendment request:

- Application for Pesticide, EPA Form 8570-1;
- Two (2) copies of the proposed Alternate #1 CSF; and
- One (1) copy of the current basic CSF on file with the EPA.

The only change on this new, alternate CSF is to add a new contract manufacturer which is located in the USA [REDACTED]. The new manufacturing facility uses the same manufacturing process that has previously been approved by the U.S. Environmental Protection Agency (EPA). The new manufacturer has stated that it will meet the specifications listed on the CSF; therefore, we have submitted this change as a notification.

No label is being submitted as this change does not affect the label text for this technical product.

This notification is consistent with the provisions of the PR Notice 98-10 and EPA regulations at 40 CFR 152.46, and no other changes have been made to the labeling or the confidential statement of formula of this product. I understand that it is a violation of 18 USC Sec. 1001 to willfully make any false statement to the EPA. I further understand that if this notification is not consistent with the terms of PR Notice 98-10 and 40 CFR 152.46, this product may be in violation of FIFRA and may be subject to enforcement action and penalties under sections 12 and 14 of FIFRA.

If you have any questions regarding this submission, please contact me at (317) 580-8286 or amy@sepro.com.

Sincerely,

Amy Dugger-Ronyak
Regulatory Affairs Specialist

Enclosures

Product ingredient source information may be entitled to confidential treatment



United States
Environmental Protection Agency
Washington, DC 20460



Registration
Amendment
Other

OPP Identifier Number

Application for Pesticide - Section I

1. Company/Product Number 67690-16	2. EPA Product Manager Tony Kish	3. Proposed Classification <input checked="" type="checkbox"/> None <input type="checkbox"/> Restricted
4. Company/Product (Name) Cutless Technical	PM# 22	
5. Name and Address of Applicant (Include ZIP Code) SePRO Corporation 11550 N. Meridian Street, Suite 600 Carmel, IN 46032 <input type="checkbox"/> Check if this is a new address	6. Expedited Review. In accordance with FIFRA Section 3(c)(3) (b)(i), my product is similar or identical in composition and labeling to: <input checked="" type="checkbox"/> EPA Reg. No. _____ Product Name _____	

Section - II

<input type="checkbox"/> Amendment - Explain below.	<input type="checkbox"/> Final printed labels in response to Agency letter dated _____
<input type="checkbox"/> Resubmission in response to Agency letter dated _____	<input type="checkbox"/> "Me Too" Application.
<input checked="" type="checkbox"/> Notification - Explain below.	<input type="checkbox"/> Other - Explain below.

Explanation: Use additional page(s) if necessary. (For section I and Section II.)

Submission of an alternate formulation (#1) as a minor formulation amendment pursuant to PRN 98-10.

Section - III

1. Material This Product Will Be Packaged In:				2. Type of Container	
Child-Resistant Packaging <input type="checkbox"/> Yes* <input checked="" type="checkbox"/> No	Unit Packaging <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Water Soluble Packaging <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input type="checkbox"/> Metal	
* Certification must be submitted				<input type="checkbox"/> Plastic	
				<input type="checkbox"/> Glass	
				<input checked="" type="checkbox"/> Paper	
				<input type="checkbox"/> Other (Specify) _____	
3. Location of Net Contents Information <input checked="" type="checkbox"/> Label <input type="checkbox"/> Container		4. Size(s) Retail Container various		5. Location of Label Directions <input checked="" type="checkbox"/> On Label <input type="checkbox"/> On Labeling accompanying product	
6. Manner in Which Label is Affixed to Product <input checked="" type="checkbox"/> Lithograph <input type="checkbox"/> Paper glued <input type="checkbox"/> Stenciled		<input type="checkbox"/> Other _____			

Section - IV

1. Contact Point (Complete items directly below for identification of individual to be contacted, if necessary, to process this application.)		
Name Amy Dugger-Ronyak	Title Regul. Affairs Specialist	Telephone No. (Include Area Code) 317-580-8286
Certification I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law.		6. Date Application Received (Stamped)
2. Signature 	3. Title Regulatory Affairs Specialist	
4. Typed Name Amy Dugger-Ronyak	5. Date July 22, 2008	

FOR OFFICIAL USE ONLY

PA-212
FILE SYMBOL

62719-FRE

REGISTRATION NO.

RD
-26-91
CONFIDENTIAL STATEMENT OF FORMULA ENCLOSED

DATE SUBMITTED	SUBMITTED BY (✓)	
	APPLICANT	BASIC SUPPLIER
4-22-91	✓	

Do Not Write Comments,
Formula, or Parts of Formula
on This Envelope

NOTE

It shall be unlawful—for any person to use for his own advantage or to reveal, other than to the Secretary, or officials or employees of the United States Department of Agriculture or other Federal agencies, or to the courts in response to a subpoena, or to physicians, and in emergencies to pharmacists and other qualified persons, for use in the preparation of antidotes, in accordance with such directions as the Secretary may prescribe, any information relative to formulas of products acquired by authority of Section 4 of the "Federal Insecticide, Fungicide, and Rodenticide Act."

